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TABLE OF CONTENTS

Harvey and the Scientific Method SIR HENRY COHEN, M.D., LL.D., F.R.C.P. 1405

Mild Cushing's Syndrome Due to Aspirin
J. B. COCHRAN, M.B., F.R.F.P.S., M.R.C.P., R. D. WATSON, B.Sc., and J. REID, M.D., M.R.C.P. 1411

Evaluation of Treatment in Intermittent Claudication J. T. SHEPHERD, M.B. 1413

Intramuscular Heparin D. GORDON ABRAHAMS, M.D., M.R.C.P. 1418

Anaesthesia in the Newborn G. JACKSON REES, M.B., D.A. 1419

Obstetric Analgesia and Placental Insufficiency
E. H. SEWARD, B.M., D.Obst.R.C.O.G. 1422

MEDICAL MEMORANDA

Vulvovaginitis in a Child due to *Shigella flexneri*. W. J. MCGINNESS, M.B., ch.B., and R. C. TELLING, F.I.M.L.T. ..1424
Herpes Zoster Provoked by Smallpox Vaccination. KEMBLE GREENWOOD, M.B., M.R.C.P.Ed. 1424
Torsion of the Gall-bladder. K. P. S. CALDWELL, M.B., F.R.C.S. 1425

REFRESHER COURSE

The Treatment of Lumbar Disk Lesions.
JAMES CYRIAX, M.D. 1434

GENERAL ARTICLES AND NEWS

Mars and Aesculapius. Sir ARTHUR PORRITT, M.Ch., F.R.C.S. 1438
The "Cambridge" Exchange Transfusion Outfit. C. B. V. WALKER, M.B. 1441
HAPPY CHRISTMAS! 1442
THE DOCTOR AND THE MINISTER 1443
UNIVERSITIES AND COLLEGES 1452
MEDICAL NEWS 1452
BIRTHS, MARRIAGES, AND DEATHS 1453
QUESTIONS AND COMMENTS 1455

OBITUARY

Henry MacCormac, C.B.E., M.D., F.R.C.P. 1449
W. Brooke Purdon, D.S.O., O.B.E., M.C., M.B. 1449
S. Watson Smith, M.D., F.R.C.P. 1450
F. M. Milne, M.B. 1450
G. H. Culverwell, O.B.E., M.D. 1451

LEADING ARTICLES

A Toast to Bacchus 1428
Fertility and Intelligence 1429
Thrush in Infants 1430

ANNOTATIONS

Bacteriological Grading of Ice-cream ..1431
Aspirin and Cortisone 1432
Electron Microscopy 1432
Anaesthesia in the Newborn 1433
Treatment with Heparin 1433

REVIEWS

The Science of Genetics 1426
Guide-book to British Medicine 1426
Lectures on Anatomy 1426
Treatment with Quinidine 1426
Community Health 1427
Books Received 1427

MEDICO-LEGAL

Alleged 360-day Pregnancy 1451

SUPPLEMENT

GENERAL MEDICAL SERVICES COMMITTEE *251*
G.M.S. SUBCOMMITTEE (SCOTLAND) *251*
PRIVATE PRACTICE COMMITTEE *251*
Change of General Practitioner—TEMPORARY RESIDENTS *252*
HEARD AT HEADQUARTERS *252*
B.M.A. LIBRARY *253*
CORRESPONDENCE *253*
ASSOCIATION NOTICES *254*
H.M. FORCES APPOINTMENTS *254*

CORRESPONDENCE

Displaced Registrars. A. S. JARMAN, M.D. 1443
Training Registrars. L. M. BILLINGHAM, M.R.C.S., and J. W. LACEY, M.D. 1443
Registrars and Health Service Policy. P. HICKINBOTHAM, F.R.C.S. 1444
Producing Anaesthesia of Trigeminal Nerve Distribution. WILFRED HARRIS, M.D.; JOHN PENMAN, M.B. 1444
Antihistamines and the Common Cold. J. M. BREWSTER, M.D. 1444
Causes of Death in Diabetes. ELLIOTT P. JOSLIN, M.D. 1445
Urethra Obstructed by Crystals. J. T. RICE-EDWARDS, F.R.C.S.Ed. 1445
Erythrocyte Sedimentation in Anaemia. B. M. WRIGHT, M.B.; H. DLUGOSZ, M.D.; H. S. KELLETT, M.D. 1445
Marking Varicose Veins. E. WILSON, F.R.C.S. 1446
Myocardial Infarction after Tetraethylammonium Therapy. CHARLES ENGEL, M.D. 1446
Fibrillation and Flutter. C. P. PETCH, M.D. 1447
Euthanasia. C. K. MILLARD, M.D.; F. J. MOYNIHAN 1447
Cost of Academic Clinical Office. G. G. SHERRIFF, M.B. 1447
A Failing Policy. J. R. W. HAY, M.D. 1447
Pulmonary Complications of Pertussis. D. NICHOLSON, M.D. 1448
Points from Letters 1448

Epidemiology Section 1453

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY DECEMBER 23 1950

HARVEY AND THE SCIENTIFIC METHOD*

BY

Sir HENRY COHEN, M.D., LL.D., F.R.C.P.

Corresponding Member of the Harveian Society of London

No compliment could be more acceptable to a physician than an invitation to deliver a lecture adorned by the name of Harvey. Yet the task and responsibility which the honour conveys are less enviable, and increase in difficulty as the years advance. Two hundred and thirty Harveian orators at the Royal College of Physicians and nearly a hundred Harveian lecturers of this distinguished society have probed deeply and well-nigh exhausted all that might be said of Harvey, his life and times, his contemporaries and forebears, his philosophy, and his contributions to medicine and science. So little would seem to remain that some orators and lecturers, having faced their difficulties, have solved them by avoiding them and have unashamedly deleted Harvey from the theme of their discourses, whilst not a few have sought refuge in the reflection of the French writer that "everything has been said before, but since nobody seems to listen we can say it all over again." As my tale unfolds you may well believe that I am not wholly guiltless of this exprobation.

Yet new facts concerning Harvey are still being revealed, and in the past year Harveian literature has been splendidly enriched by Mr. Geoffrey Keynes in his Linacre and Thomas Vicary Lectures dealing with the personality and portraiture of Harvey. The physician must feel deeply the passing of the initiative in this field of medical scholarship to the surgeon; if he is wise he will not be addulced by Mr. Keynes's assertion that "as a surgeon I belong to the less learned half of the medical profession"; rather will he sense that this is a meretricious concession not to the superior learning of the physician but to his overweening conceit.

But there is an aspect of history more significant than the study of persons and portraits, a study which is too apt to reflect the personality, not of the subject, but of the biographer and the artist. As Sir Arthur Helps has written:

> "To us, my friend, the times that are gone by
> Are a mysterious book, sealed with seven seals:
> That which you call the spirit of ages past
> Is but, in truth, the spirit of some few authors
> In which those ages are beheld reflected,
> With what distortion strange heaven only knows.
> History!
> Facts dramatized say rather—action—plot—
> Sentiment, everything the writer's own,
> As it best fits the web-work of his story,
> With here and there a solitary fact
> Of consequence."

*The Harveian Lecture delivered before the Harveian Society of London on March 22.

We can, however, study the mind of the man and its working in his writings. It is this which conveys to us a due sense of his greatness; it is this which helps us to assess his contribution to that irrepressible insurgence of the human spirit which reveals itself in the advancing frontiers of knowledge. It explains why we place Harvey amongst the greatest physicians of all times, not because he *discovered* that the blood circulates but because he *demonstrated* beyond all reasonable doubt that the blood circulates. It is with the Harveian method that I propose to concern myself in this lecture, and with why after he had demonstrated "the passage of the blood from the veins into the arteries and of the manner in which it is transmitted and distributed by the action of the heart" he was constrained to write: "But what remains to be said upon the quantity and source of the blood which thus passes, is of a character so novel and unheard-of that I not only fear injury to myself from the envy of a few, but I tremble lest I have mankind at large for my enemies, so much doth wont and custom become a second nature. Doctrine once sown strikes deep its root, and respect for antiquity influences all men. Still the die is cast, and my trust is in my love of truth, and the candour of cultivated minds."

In this passage Harvey hints at the bases, the reasons for human beliefs. Translated into modern terminology these resolve themselves into four groups—the methods of tenacity, authority, intuition, and science or reflective inquiry.

Method of Tenacity

Tenacity, obstinacy, perseveration, call it what you will, is the spring of many of the doctrines we hold to be true. The pain of a new idea, said Walter Bagehot, is one of the greatest pains to human nature. "It is as people say, so upsetting; it makes you think that after all your favourite notions may be wrong, your firmest beliefs ill founded; it is certain that till now there was no place allotted in your mind to the new and startling inhabitant; and now that it has conquered an entrance, you do not at once see which of your old ideas it will not turn out, with which of them it can be reconciled, and with which it is at essential enmity."

And Wilfred Trotter (1932), in his "Commemoration of Great Men"—and I commend not merely this but all that he wrote to your attention—said: "The mind delights in a static environment, and if there is any change to be itself the source of it. Change from without, interfering as it must with the sovereignty of the individual, seems in its very essence to be repulsive and an object

of fear. A little self-examination tells us pretty easily how deeply rooted in the mind is the fear of the new, and how simple it is when fear is afoot to block the path of the new idea by unbelief and call it scepticism, and by misunderstanding and call it suspended judgment."

A glance at our medical textbooks establishes that habit or inertia makes it easier for us to continue to believe a proposition simply because we have always believed it. Fables about the value of drugs and other forms of therapy, and of such diagnostic measures as percussion, persist because we close our minds to all contradictory evidence. History may not repeat itself but the writers of textbooks do, and their reiteration, be it true or false, strengthens our beliefs. Moreover, the interests of ourselves, our country, our religion, our business or profession—all these and a host of others—will determine how far we insulate ourselves from contrary views and opinions. And since we have different interests we shall cling to different beliefs. Thus the method of tenacity is incapable of deciding between conflicting views.

Method of Authority

Secondly, as a basis of belief there is the method of authority, the appeal to an accepted source which in the highest degree is regarded as infallible. Two forms of appeal to authority must be clearly distinguished. One is both reasonable and inevitable. In the practice of medicine, for example, no one man can have the time, even if he had the ability, to find out all knowledge for himself. He accepts the carbohydrate values of certain foodstuffs given by competent authorities; he does not question that specific patterns in an electrocardiogram indicate a posterior cardiac infarction, or that herpes zoster is a virus infection. But he retains the right to question the authorities if his own experiences cause him to doubt their dicta; there are other authorities to whom he can appeal; and, indeed, if he is prepared to do so he can acquire the competence and experience himself with which to test the validity of the pronouncements of authority.

The second form of appeal to authority is fundamentally different. It "invokes an external source, which it invests with infallibility and finality to give sanction to beliefs." This is the basis of many of our religious beliefs and our political affinities even to-day, and in the history of science it has played a sinister and obstructive part. Even Vesalius in 1543 was content to teach the Galenic doctrine of the ebb and flow of blood, which, as I shall later describe, demanded a perforated ventricular septum. He wrote: "The septum of the ventricle, composed as I have said of the thickest substance of the heart, abounds on both sides with little pits impressed in it. Of these pits, none, so far at least as can be perceived by the senses, penetrate through from the right into the left ventricle, so that we are driven to wonder at the handiwork of the Almighty, by means of which the blood sweats from the right into the left ventricle through passages which escape human vision."

You will observe that he permits himself to express not doubt at the teaching of Galen but wonder at the handiwork of the Almighty, who could create a ventricular septum which allowed the passage of blood though no perforations are visible; but perhaps his true belief is hinted at in a later writing, when he confessed that he "accommodated his statements to the dogmas of Galen not because he thought that these were in all consonant with truth but because in such a new great work he hesitated to lay down his own opinions, and did not dare to swerve a nail's breadth from the doctrines of the Prince of Medicine."

The influence of authority is perhaps most strikingly exemplified in the sentence of the Inquisition on Galileo in 1633 for maintaining that the earth goes round the sun. Recollect that this was five years after Harvey had published *De Motu Cordis* and you will better appreciate the courage and magnitude of Harvey's contribution. For in his time the methods of tenacity and authority dominated anatomy and medicine. The anatomist saw only what his mind had been attuned to see by the prior dicta of his teachers; he selected, perhaps unconsciously, what confirmed accepted doctrine. The purpose of dissection in Harvey's time was not to ascertain new facts but to demonstrate the truth of Galenic teaching; the assistant dissected the body, and the lecturer, seated apart, recited the appropriate passages from the works of Galen.

There were a few anatomists, however, prepared to dispute the authority of Galen. Of these, Matheus Realdus Columbus, a man of dubious integrity, who succeeded Vesalius at Padua in 1544, was the most outspoken, for in his *De Re Anatomica Libri XV*, published in 1559 after his death (a fact which might explain his frankness), occurs this indictment of his fellow anatomists: "But for these it is enough that Galen said so. What? To think that some folk in our time swear to the dogmas of Galen about anatomy so that they dare to assert that Galen ought to be taken as gospel, and that there is nothing in his writings which is not true! It is wonderful how men are carried away by this doctrine; and the princes of the anatomy offer it to the rabble. Yet no one sees how much this is to be blamed. Who indeed is there who never offends? But of this enough and more than enough."

Any chapter in the history of human thought will reveal that there can be no uniformity or stability of belief for *Homo sapiens*—the species with the inquiring, the inquisitive mind—which is based on authority, for authorities differ.

Method of Intuition

Is there a better guarantee of stable beliefs than those we have thus far discussed? Some have chosen and urged the method of intuition, the acceptance of truths which when uttered are seen to be and are accepted as self-evident, and they point in support to the utterances of the prophets and poets. But intuitions must be tested by experience, for intuitions are only self-evident within an accepted framework.

It was at one time "self-evident" that the earth was flat, and that the sun moved round the earth; to some it is self-evident that polygamy is a sin; and most people would accept such intuitions as that every effect must have a cause, and that the axioms of Euclidian geometry are true. For most propositions self-evidence has been claimed, yet it is not difficult to establish that early training, inherent desires, and current knowledge play a large part in the formulation of our intuitions, and the certainty and authority with which we utter them is no guarantee of their validity.

Method of Science or Reflective Inquiry

It is the fourth method of arriving at truth, the method of science or reflective inquiry, which is the essence of my theme. Scientific method has been so often described that it may seem unnecessary to elaborate its content and its form, but there are certain aspects of it which in

relation to Harvey's work need elaboration if his contribution to the stream of human thought is to be properly assessed. It is customary to describe three main stages in arriving at a scientific truth. First, there is the observation of significant facts; secondly, a hypothesis is formulated which, if true, would account for the facts; and thirdly, from the hypothesis are deduced consequences whose validity can be tested by observation or experiment.

This is, I suggest, an over-simplification. The first stage of most discoveries is the chance observation, which in not a few instances has been associated with the false assumption. From the time that King Hiero asked Archimedes to test his suspicion that his artificers were alloying gold with silver in his crown, and Archimedes, by chance, noticed that in his bath he displaced water equal to the volume of his body and realized at once that, weight for weight, the lighter alloy would displace more water than the heavier gold, to Fleming's observation on *Penicillium notatum*, the path of the history of science is strewn with the fruits of accidental observations.

But we must not forget with Pasteur that "chance only visits the mind that is prepared." The chance observation lights the spark only in the mind of the receptive, and he responds by a tentative, a very tentative, hypothesis or hypotheses which lead him to seek *significant* facts, by observation or experiment. The operative word is "significant." There must be critical discrimination in the selection of apposite data; there must be lack of bias, and face value must not mislead. It is a mark of scientific ability to be able to distinguish the significant facts and to know where and how they may be found. In other words, "observation of significant facts" is not uncontrolled observation, but observation with a purpose. Meandering aimlessly and unguided in the realm of nature is rarely a profitable pursuit. When the significant facts are assembled possible explanations are formulated; an attempt is made to produce order out of chaos; for science is interested in systems and classes, in generalizations.

It is here that formal logic plays its part. But formal logic is not scientific method. It is an instrument which demonstrates to us that if certain propositions are true others also are true, but logic does not establish the truth of our initial premises. Formal logic aids us in devising ways of formulating hypotheses explicitly and accurately. If alternative hypotheses are available logic helps us in the next stage of our scientific method; it helps us to develop the consequences of these alternative hypotheses so that when compared with other observable phenomena we can test which hypothesis is in harmony with the observed facts.

To summarize, the stages in the method of science as exemplified by its history are: (i) the chance observation; (ii) the immediate reactive hypothesis; (iii) the search for significant facts which confirm or refute the initial hypothesis or (iv) lead to further hypotheses (induction), which can (v) be tested by observation and experiment (deduction).

It is perhaps necessary to re-emphasize, for those who hold the Baconian view that the mere orderly arrangement of data would make the right hypothesis obvious, that at each stage of scientific inquiry ability (it may be intuition) often amounting to genius is indispensable. As Butterfield (1949) has observed: "Of all forms of mental activity the most difficult to induce, even in the minds of the young who may be presumed not to have lost their flexibility, is the art of handling the same bundle of data as before, but placing them in a new system of relations with one another, by giving them a different framework, all of which virtually means putting on a different kind of thinking-cap for the moment" But any logically trained mind, once the sequence is pointed out, must of necessity accept the conclusion or question the accuracy of the observations or the validity of the logical processes which led to the hypothesis.

The Galenic Doctrine

Let us within this scheme of belief consider the contribution which Harvey made to the knowledge of the heart and blood vessels. Until his day, and indeed for many years after in places where the methods of tenacity and authority held sway, the universal teaching was the Galenic doctrine. This regarded the heart as a source of heat, an innate God-given property persisting from the beginning to the end of life. Food particles passed from the gut by the portal vein to the liver, where a crude blood of base nutritive quality (said to be endowed with "natural spirit") was manufactured and, passing to the right side of the heart, was sent by flow and ebb to irrigate the tissues and organs. Diastole of heart and veins occurred at the same time. The "natural spirit" flowed (*a*) through the venae cavae to all the tissues and (*b*) through the artery-like vein (what we now call the pulmonary artery) to the lungs, for their nutrition; and (*c*) through invisible pores of the ventricular septum to the left side of the heart. The left heart received also air direct from the trachea and bronchi and through skin and tissues, which not only cooled the innate heat of the heart but by mixing with the blood seeping through from the right heart gave rise to the "vital spirit" which was conveyed again by ebb and flow, with synchronous diastole of heart and arteries, to the tissues, endowing them with their "vital" functions.

In the process of forming "vital spirit," attributed to a fermentative activity, fuliginous vapours arose which were carried to the lungs and tissues for excretion. The brain had its special function: from the arterial blood which is received it distilled off the "animal spirit" (the breath of the soul), which was carried along nerves for movement and sensation.

Galen's Critics

The Galenic view had its critics even before Harvey's day. That air passed direct from lungs to heart had been doubted by Leonardo da Vinci, who found it impossible to pump air into the heart through the trachea and bronchi. Vesalius, as we earlier saw, had been unable to demonstrate the septal pores. Michael Servetus had published in 1553 an earlier written work, *Restitutio Christianismi*, in which he inferred that the passage of blood from right ventricle to left "does not, as is generally believed, take place through the median wall septum of the heart, but by a signal artifice the subtle blood is driven by a long passage through the lungs." He then repeats the Galenic view that "it is mixed with the inspired air, and by expiration is cleansed from its fumes. And so at length it is drawn in a complete mixture, by the left ventricle through the diastole, stuff fit to become the vital spirit." His reasons for accepting the lesser or pulmonary circulation merit recall. He writes: "This view is confirmed by the conspicuous size of the artery-like vein which would not have been made so large and so stout, and would not discharge from the heart itself such a power of very pure blood into the lungs, for the mere purpose of nourishing these organs. Nor would the heart serve the lungs in this manner, especially since at an earlier date in the embryo on account of

the little membranes of the heart, the lungs themselves are up to the hour of birth nourished from other sources, as Galen teaches."

Columbus, too, had in 1559, in the work to which I earlier referred, rejected the view that blood passed from right to left ventricle through the septum, and he enunciated the pulmonary circuit. But he was a proved plagiarist in that he falsely claimed to have discovered the stapes which from Fallopius we know to have been earlier described by John Phillip Ingrassias, of Palermo; and he may well have seen a copy of the *Restitutio* of Servetus and claimed the discovery as his own.

It was Andreas Caesalpinus, professor of medicine at Pisa, great both as scholar and as disputant, who came closest to Harveian views in his opposition to Galen, and he incorporated his conclusions in two books. In the first, *Quaestiones Peripateticae*, published in 1571, he states, from a study of the valves of the heart and their directional opening and closing, that the heart in systole propels blood into the aorta and pulmonary artery, and in diastole receives blood from the venae cavae and pulmonary vein. And again, in his *Quaestiones Medicae* in 1593, he appears to have recognized that blood flows from arteries to veins, and along the veins to the heart. He noted also that veins when ligated swell on the far side—"a fact well known by experience to those who let blood"—and he recognized that this was in opposition to Galenic teaching. But, though Caesalpinus clearly formulated the pulmonary circulation and groped after a systemic circulation, he was making assertions unsupported by careful observation or experiment; and his views did not influence the teachings of his contemporaries.

Harvey in Padua

Whatever contributions da Vinci, Vesalius, Servetus, Columbus, Caesalpinus, and even Fabricius may have made to the idea of the circulation of the blood, they are insignificant when compared with Harvey's. He stands alone by virtue of his *methods* rather than by his *discovery*, great as were to be the repercussions of that discovery on the growth of scientific medicine.

But, given that he was a man of genius, how was his mind prepared for the rich harvest it was later to yield? The field was ploughed and the seeds first sown in the University of Padua, which as late as 1670 was described as "the Imperial University for Physic of all others in the world." It played an impressive part in freeing Harvey's mind, for of all European universities it was the least shackled in the fetters of authoritarianism. It had fallen under the rule of Venice in 1404, and Venice was at that time and for long after the most anticlerical State in Europe. Experimental and quantitative methods of investigation were there early introduced into the physical and biological sciences, and it is not surprising that in a university so highly secularized as Padua doubts were early harboured about the part which final causes play in natural philosophy. The question "How?" assumed greater importance than "Why?"; and the answer to "How?" in a university which sheltered Copernicus and Galileo at important periods of their lives had naturally a large mechanical bias. Thus it was that Harvey, in contrast to his predecessors and indeed contemporaries, professed both to learn and to teach anatomy, not from "books but from dissections; not from the positions of philosophers but from the fabric of nature"; and for him the heart "is in a piece of machinery in which, though one wheel gives movement to another, yet all the wheels seem to move simultaneously."

That Harvey should turn to the heart for his major interest can occasion no surprise. The pulse and breathing were problems of movement in living organisms suggested by the kinetics of matter which he had heard discussed at Padua. Moreover, with Aristotle, he regarded (as he writes in his introduction to *De Motu Cordis*) "the heart of animals as the foundation of their life, the sovereign of everything within them, the sun of their microcosm, that upon which all growth depends, from which all power proceeds." I suspect that this panegyric was influenced, however, by the need for an appropriate analogy with which to dedicate his work to his patient and monarch, that "most illustrious and indomitable prince, Charles, King of Great Britain, France, and Ireland, Defender of the Faith."

Whilst Harvey was in residence in Padua, Fabricius, his master and friend, was perfecting his knowledge of the valves of the veins which he was to record in 1603 in the small treatise *De Venarum Ostiolis*. This must have excited Harvey's interest, though there is nothing to show that he appreciated at that time the significance of the direction of the orifices of these valves or that he rejected Fabricius's interpretation of their function on the basis of Galenic doctrine—namely, that they were there to slow the flow and check the accumulation of large quantities of blood at the periphery.

Harvey's predecessors had known that when veins were cut or ligated blood flowed out of them in the direction of the heart, but so attached were they to Galenic doctrine that they explained it as "blood behaving irregularly when tortured by such experiments, rushing off in the wrong direction like a fluttering, frightened hen." Osler quotes Boyle as saying that in the only conversation he ever had with him Harvey acknowledged that a study of the valves of the veins had led him to the discovery of the circulation of the blood. Yet I suspect that a chance observation was the spark which set alight the conflagration which consumed Galenic doctrine, an observation to which no author seems hitherto to have drawn attention.

In order to demonstrate that the arteries were filled with blood and not air, as Erasistratus had maintained in naming them, Galen had carried out a simple experiment. "If you include a portion of the artery between two ligatures," he wrote, "and slit it open lengthways, you will find nothing but blood"; and, as Harvey comments, "thus he proves that the arteries contain blood only." But Harvey went further: "We too may be permitted to proceed by a like train of reasoning: if we find the same blood in the arteries as in the veins, after having tied them in the same way, as I have myself repeatedly ascertained, both in the dead body and in living animals, we may fairly conclude that the arteries contain the *same blood as the veins, and nothing but the same blood.*"

Is it not likely that this observation started a train of reasoning in Harvey's mind? He had been tutored in the Galenic teaching that the veins are filled with a crude blood containing "natural spirit" and the arteries with a lighter blood replete with "vital spirit"; yet Harvey believed that the blood he saw in the arteries and veins was the *same*—an inaccurate observation when critically assessed, but surely the most probable source of the inference that, since the blood is the same, there must be continuity or communication between arteries and veins. With this in mind Harvey then sought for significant facts, but before so doing he disposed of certain hypotheses by revealing their inconsistencies with known facts; indeed, the introduction to *De Motu Cordis* is a model critical review of past work. There is no doubt that in Harvey's mind the

idea of the circulation was formulated early, for in his notes to his Lumleian Lectures at the College of Physicians in April, 1616, he writes of it in a curious mixture of Latin and English:

"constat per fabricam cordis sanguinem per pulmones in Aortam perpetuo transferri, as by two clacks of a water bellows to rayse water constat per ligaturam transitum sanguinis ab arteriis ad venas unde perpetuum sanguinis motum in circulo fieri pulsu cordis." ("It is proved through the structure of the heart that blood is constantly transferred through the lungs into the aorta, as by two clacks of a water bellows to raise water. It is proved by ligatures that blood passes from arteries to veins whereby the heart's beat produces a perpetual motion of blood in a circle.")

Mechanics of the Heart

With the bare idea of a circulation in his mind he sought for significant facts, but he sought them in relation to a significant question, which merely to ask, let alone to answer, was a remarkable innovation, for in the true spirit of science he isolated from a mass of irrelevant considerations the one which was amenable to scientific treatment—namely, the mechanics of the heart. His predecessors had asked, "Why?" about the heart and concerned themselves with "heat, spirit, and perfection," which, as Harvey rightly said, must be "decided upon other grounds." Harvey asked, "How?" and only occasionally did he deviate from this question.

The first task of the scientist is to find how he may make his most significant observations, and what material is best suited for his task—a point illustrated in recent years, for example, by the use of the giant axon of the squid in experiments on nerve conduction, and by T. H. Morgan in selecting the fruit-fly, *Drosophila*, for his genetic studies because of its rapid reproduction and its clearly defined chromosomes. Now, Harvey writes:

"When I first gave my mind to vivisections, as a means to discovering the motions and uses of the heart, and sought to discover these from actual inspection, and not from the writings of others, I found the task so truly arduous, so full of difficulties, that I was almost tempted to think, with Fracastorius, that the motion of the heart was only to be comprehended by God. *For I could neither rightly perceive at first when the systole and when the diastole took place, nor when and where dilatation and contraction occurred, by reason of the rapidity of the motion, which in many animals is accomplished in the twinkling of an eye, coming and going like a flash of lightning;* so that the systole presented itself to me now from this point, now from that; the diastole the same; and then everything was reversed, the motions occurring, as it seemed, variously and confusedly together. My mind was therefore greatly unsettled, nor did I know what I should myself conclude, nor what believe from others. I was not surprised that Andreas Laurentius should have written that the motion of the heart was as perplexing as the flux and reflux of Euripus had appeared to Aristotle."

But Harvey was not defeated, and he found his suitable material in cold-blooded animals with slowly beating hearts and in the dying warm-blooded animal when the heart begins to flag.

Harvey's Test of his Views

Between the crude formulation of his hypothesis and the publication of his *De Motu Cordis* Harvey was engaged in collecting data from human anatomy (for he held that design indicated function), from comparative anatomy, from embryology, from animal experiments, and from clinical observations which would test his views. Only a few examples can be quoted, but especially significant are his observations on the structure of the valves of the veins and on the arrangement of the circular and longitudinal fibres of the heart; on his condemnation of those who "confine their researches to the human body alone, and that when it is dead," and who "upon the ground of one particular proposition should proceed to draw general conclusions." So he turned to comparative anatomy and embryology, and thus he argues from the fishes with a single ventricle and no lungs, through amphibians with lungs and a single ventricle, and the human foetus with its unidirectional foramen ovale and ductus arteriosus, leading to the probability that in warm-blooded animals the passage from vena cava to aorta is accomplished through the substance of the lungs.

His experiments included the application of ligatures in the living animal, perfusions, and experimental observations on man, including those illustrated in *De Motu Cordis* which revealed with certainty the centripetal one-way flow of blood in the veins and the absolute bar afforded by the valves to a peripheral venous reflux. His clinical observations were accurate (for example, he knew of the insensitivity of the heart muscle to pricking and pinching), and they were apposite to his thesis. He denied that the arterial wall itself originated the pulse, because false aneurysms pulsated though they had no arterial covering, and because blood spurts in regular jets out of even the calcified artery, whose rigid wall prevents pulsation. He calls in evidence of the circulation the general spread in the body of "contagions, poisons from wounds, bites of serpents and rabid animals, lues venerea, and the like" even though "the part first infected remains sound." Indeed, so clear are his observations and so cogent his reasoning that I would insist on every medical student having *De Motu Cordis* as a set book for his preclinical studies.

Quantitative Considerations

But there is yet another form of argument which Harvey introduces, as Singer (1928) emphasizes, for the first time in biological literature; that is, the *quantitative* considerations which would be expected to flow from the Galenical theory.

"Let us assume," writes Harvey, "whether arbitrarily or from experiment, the quantity of blood which the left ventricle of the heart will contain when distended to be, say, two ounces, three ounces, or one ounce and a half—in the dead body I have found it to hold upwards of two ounces. Let us assume further, how much less the heart will hold in the contracted than in the dilated state; and how much blood it will project into the aorta upon each contraction—and all the world allows that with the systole something is always projected, a necessary consequence demonstrated in the third chapter, and obvious from the structure of the valves; and let us suppose as approaching the truth that the fourth, or fifth, or sixth, or even the eighth part of its charge is thrown into the artery at each contraction; this would give either half an ounce, or three drachms, or one drachm of blood as propelled by the heart at each pulse into the aorta; which quantity, by reason of the valves at the root of the vessel, can by no means return into the ventricle. Now in the course of half an hour, the heart will have made more than one thousand beats, in some as many as two, three, and even four thousand. Multiplying the number of drachms propelled by the number of pulses, we shall have either one thousand half ounces, or one thousand times three drachms, or a like proportional quantity of blood, according to the amount which we assume as propelled with each stroke of the heart, sent from this organ into the artery; *a larger quantity in every case than is contained in the whole body!* In the same way, in the sheep or dog, say that but a single scruple of blood passes with each stroke of the heart, in one half-hour we should have one thousand scruples, or about three pounds and a half of blood injected into the aorta; but the body of neither animal contains above four pounds of blood, a fact which I have myself ascertained in the case of the sheep.

"Upon this supposition, therefore, assumed merely as a ground for reasoning, we see the whole mass of blood passing

through the heart, from the veins to the arteries, and in like manner through the lungs.

"But let it be said that this does not take place in half an hour, but in an hour, or even in a day; any way it is still manifest that *more blood passes through the heart in consequence of its action, than can either be supplied by the whole of the ingesta, or than can be contained in the veins at the same moment.*"

And so by advocacy, cogent and unassailable, we too must conclude with Harvey that:

"Since all things, both argument and ocular demonstration, show that the blood passes through the lungs and heart by the force of the ventricles, and is sent for distribution to all parts of the body, where it makes its way into the veins and porosities of the flesh, and then flows by the veins from the circumference on every side to the centre, from the lesser to the greater veins, and is by them finally discharged into the vena cava and right auricle of the heart, and this in such a quantity or in such a flux and reflux thither by the arteries, hither by the veins, as cannot possibly be supplied by the ingesta, and is much greater than can be required for mere purposes of nutrition; it is absolutely necessary to conclude that the blood in the animal body is impelled in a circle, and is in a state of ceaseless motion; that this is the act or function which the heart performs by means of its pulse; and that it is the sole and only end of the motion and contraction of the heart."

Passages from Arteries to Veins

Yet there was a missing link in Harvey's demonstration—the channels of communication between arteries and veins, which were to be revealed by Malpighi in 1661. With the aid of his microscope he was to see the capillaries of the frog's lung. But in retrospect it seems strange to us that *Harvey did not himself perform a simple yet crucial perfusion experiment to show that the passages from arteries to veins are direct and continuous.* He was not unacquainted with the technique of perfusion, and had used it to demonstrate that water injected into the pulmonary artery passes into the left ventricle. In a letter to Paul Marquand Slegel, dated "London, this 26th of March, 1651," Harvey, then over 70 and racked with gout, relates yet another experiment devised to demonstrate the pulmonary circulation.

"Having tied the pulmonary artery, the pulmonary veins, and the aorta, in the body of a man who had been hanged, and then opened the left ventricle of the heart, we passed a tube through the vena cava into the right ventricle of the heart, and having at the same time attached an ox's bladder to the tube, in the same way as a clyster-bag is usually made, we filled it nearly full of warm water and forcibly injected the fluid into the heart, so that the greater part of a pound of water was thrown into the right auricle and ventricle. The result was that the right ventricle and auricle were enormously distended, but not a drop of water or of blood made its escape through the orifice in the left ventricle. The ligatures having been undone, the same tube was passed into the pulmonary artery and, a tight ligature having been put round it to prevent any reflux into the right ventricle, the water in the bladder was now pushed towards the lungs, upon which a torrent of the fluid, mixed with a quantity of blood, immediately gushed forth from the perforation in the left ventricle; so that a quantity of water, equal to that which was pressed from the bladder into the lungs at each effort, instantly escaped by the perforation mentioned. You may try this experiment as often as you please: the result you will still find to be as I have stated it."

The last sentence makes it clear that Harvey was well aware that consistent uniform results must ensue if the experiment is valid for scientific induction.

There are errors, many errors, in both observation and interpretation in *De Motu Cordis*, and as a speculator on ultimate causes Harvey was not far removed from his physiological predecessors for two thousand years (see Curtis, 1915). These do not detract from Michael Foster's (1901) appraisement of this work. "His wonderful book," wrote Foster in his *History of Physiology*, "or rather tract, for it is little more, is one sustained and condensed argument, but an argument founded not on general principles and analogies but on the results of repeated 'frequent appeals to vivisection' and ocular inspection. He makes good one position, and having done that advances on to another, and so marches victoriously from position to position until the whole truth is put clearly before the reader, and all that remains is to drive the truth home by further striking illustrations."

But I would suggest that Harvey's book did more than achieve its *scientific* purpose. It attacked and laid bare the shallowness of the conventional mind; it pressed for the acceptance of rational truth even if the apparent foundations of revelation and authority be undermined in the process. If man is a reasoning being, it taught, he must pursue his findings wheresoever they lead him in order, as Harvey himself avowed, that "what is true may be confirmed, and what is false set right by dissection, multiplied experience and accurate observation." If I am to describe the mind of Harvey I can do no better than borrow the words of one of Harvey's patients, Francis Bacon, of whom Harvey had cynically remarked that "he wrote philosophy like a Lord Chancellor," and who, in his *Proemium*, thus flatteringly describes himself—"A mind nimble and versatile enough to catch the resemblance of things, which is the chief point, and at the same time, steady enough to fix and distinguish their subtle differences; . . . endowed by nature with the desire to seek, the patience to doubt, fondness to meditate, slowness to assert, readiness to reconsider, carefulness to dispose and set in order; and neither affecting what is new nor admiring what is old, and hating every kind of imposture."

Conclusion

In the turmoil in which we who spend most of our days and nights in practising and teaching medicine and in trying to fashion its future there is a great need for the refreshing, calming, and cultural diversion of the literature and scholarship of our calling. The time which we can devote to reading, research, and meditation becomes less as the complexity of our lives increases. Yet there is nothing, even in the demands of our many-sided vocation, that compels us to abate our interest in our ancient masters, and especially in the workings of their minds. I have taken advantage of the opportunity which this occasion offers to express opinions and formulate judgments upon a historical and philosophical theme. I pray my critics will in justice remember, what I shall certainly not forget, that these are necessarily the work not of an expert but of an amateur.

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MILD CUSHING'S SYNDROME DUE TO ASPIRIN

BY

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Since Hench, Kendall, Slocumb, and Polley (1949) first reported the results of treating rheumatoid arthritis with 17-hydroxy-11-dehydrocorticosterone ("compound E," or cortisone) disturbing side-effects have been observed following prolonged treatment which suggest the development of a mild Cushing's syndrome. The effects which have been recorded are rounding of the facial contours, hirsutism, acne, dorsal fat pad, glycosuria and diminished glucose tolerance, sodium retention leading to oedema, alkalosis, hypertension, and alteration of psyche. Hench and his colleagues (1950) state that there is no characteristic pattern for the development of side-effects. In their series of 23 rheumatoid patients treated with cortisone or A.C.T.H. the commonest side-effects were mild and occurred in eight patients. The effects noted in these cases were "mild acne, mild hirsutism, rounding of the face, and mild irritability." According to Baehr and Soffer (1950) side-effects occur more often during the treatment of acute conditions such as disseminated lupus erythematosus than in rheumatoid arthritis.

The metabolic effects of cortisone as summarized by Carlisle (1950) are retention of sodium and water early in the course of treatment, especially on high dosage, followed by spontaneous diuresis on continued administration of the hormone or after its discontinuation. High dosage has caused increased excretion of potassium with metabolic alkalosis in some cases, and the continued administration of large doses usually produces a negative nitrogen balance. Carlisle, in describing the clinical effects of cortisone in acute rheumatic fever, states that, in addition to the beneficial effects on arthritis, pyrexia is abolished in one to four and a half days, tachycardia in three and a half to five days, and in some cases a bradycardia follows; the E.S.R. becomes normal within 12 to 18 days; haemoglobin value increases by as much as 2.4 g. within three weeks in patients in whom the pretreatment levels are low; and in almost every instance cortisone causes a slight increase in the values for serum albumin and a reduction in the values for serum globulin.

The following report is of a patient suffering from a third attack of acute rheumatic fever who under treatment with aspirin developed signs of a mild Cushing's syndrome, which disappeared as the acute attack subsided and aspirin dosage was reduced. The clinical and metabolic effects observed during aspirin therapy resemble closely those attributed to cortisone.

Case Report

A girl aged 13 was admitted to hospital on September 29, 1950, suffering from an acute attack of rheumatic fever of one week's duration. This was her third attack, and the clinical findings on admission included severe general prostration, pyrexia (104° F.—40° C.), tachycardia (120 a minute), rapid respiratory rate (44 a minute), a dry coated tongue, and a dry warm skin. The heart was grossly enlarged, the apex beat being distinctly palpable on the anterior axillary line. Apical systolic and diastolic murmurs were present and the veins of the neck were overfilled, though there was no peripheral oedema or hepatic enlargement. The lower lobe of the left lung was collapsed. An electrocardiogram suggested pericarditis, and a portable *x*-ray film of the chest showed the cardiac outline of mitral valvular disease. The collapse of the left lower lobe was probably due to pericardial effusion and cardiac dilatation. The other clinical features were acute arthritis of the joints of the second and third fingers of both hands, both wrists, and the right elbow.

The patient was given a standard diet, and on September 30 administration of a dihydroxybenzoate in doses of 1 g. daily was started, and was continued for four days. This substance is at present under test, and will be reported on later. The acute arthritis disappeared within 24 hours, the temperature and rapid respiratory rates began to fall, but there was only a slight drop in the pulse rate. Improvement was thought to be too slow, so it was decided to change to aspirin treatment on October 4. Aspirin was given in doses of 1 g. five times daily, and the temperature, pulse, and respiratory rates continued to fall.

On the second day of aspirin treatment the face appeared to have become rounded and it looked "puffy," although there was no pitting on pressure. During the next 10 days the pulse and respiratory rates slowly settled and the temperature remained about 98–99° F. (36.7–37.2° C.). On October 17, 13 days after the start of aspirin treatment, acne was observed on the front of the chest and along the hair margin of the forehead. It later spread to the shoulders and back. A specimen of urine was found at this time to reduce Benedict's solution, producing a yellowish deposit. On account of a possible salicylate fallacy, a fermentation test with controls was set up; this showed the abnormality to be a reducing sugar. It was noticed that for some days the patient had been extremely morose, would not respond to questions, and never smiled, and this demeanour seemed to be out of proportion to the malaise of her illness. She continued to improve under aspirin therapy, and on October 19 the dosage was reduced to 1 g. thrice daily. Next day the face looked a little less "puffy," and from this point cheek measurements, using special callipers, were recorded. By November 2 each cheek had shown a reduction in thickness of 1.5 mm. Aspirin dosage was further reduced to 1 g. twice daily on October 23, and to 1 g. daily on October 28 for a further four days. The rounding of the facial contours and acne gradually disappeared and she lost her surly demeanour.

A glucose tolerance test was carried out on the day after a reducing sugar was found in the urine. The blood sugar (Folin and Wu) showed a high fasting level (163 mg. per 100 ml.), rising during the following two hours well above the normal renal threshold, and the urine contained glucose. A sudden fall to levels below 130 mg. occurred at two and a half and three hours. The next day the fasting level was 147 mg. Further tests showed that glucose tolerance returned to normal as aspirin dosage was reduced (Fig. 1).

The effects of treatment on the E.S.R. (Westergren), haemoglobin level, temperature, pulse, and respiratory rates are shown in Fig. 2. The temperature reached normal limits within two days of beginning aspirin therapy, but the pulse rate fell more slowly and reached normal on the twelfth day. A few days later the patient developed a bradycardia, which lasted six days. The E.S.R. fell from an initial level of 82 mm. to 12 mm. an hour within three weeks of beginning aspirin treatment. Increase in haemoglobin value by 2.8 g. occurred within four weeks.

The results of fluid, chloride, and nitrogen balance studies are shown in Fig. 3. During the first 10 days of aspirin treatment water and chloride were retained and the output of nitrogen greatly exceeded intake. During the next 15 days the volume of urine relative to the fluid intake progressively increased, and this was accompanied by an increased output of chloride and a steady diminution in nitrogen output.

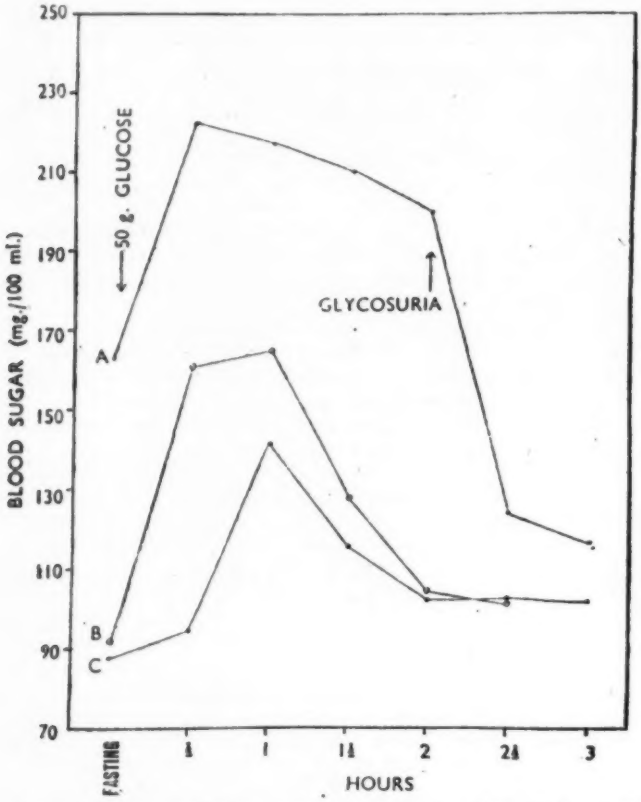

FIG. 1.—Glucose-tolerance curves after the ingestion of 50 g. of glucose following a 12-hour fast. Curve A was obtained at the height of aspirin therapy; curves B and C were obtained later, when aspirin was withdrawn.

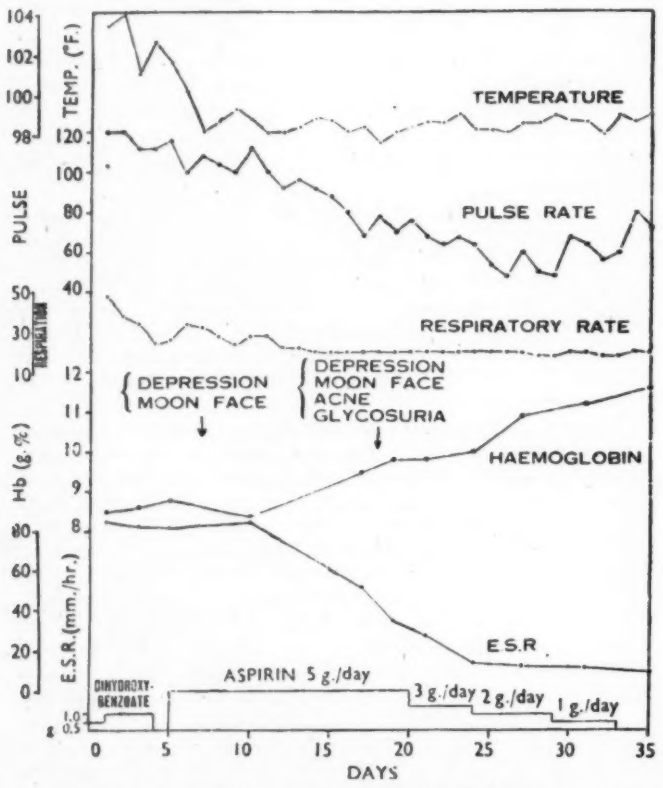

FIG. 2.—Effect of therapy on haemoglobin, E.S.R., temperature, pulse, and respiratory rates. The times of appearance of the side-effects suggesting Cushing's syndrome are indicated.

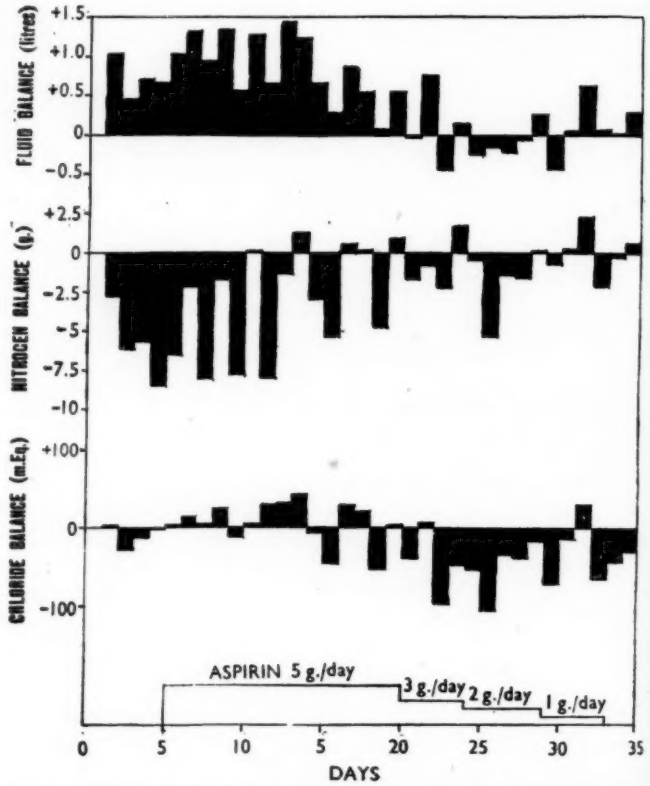

FIG. 3.—Effect of therapy on fluid, chloride, and nitrogen balance.

During the course of treatment the albumin–globulin ratio fell to normal from its original reversed state. Serum albumin rose by 2.3 g. and globulin fell by 1.7 g. Plasma fibrinogen fell from its original high level of 0.77 g.% to 0.42 g.%.

Ketosteroid excretion (Tompsett and Oastler, 1946) was estimated daily from October 17 to 30 and showed no significant alteration. The daily output varied between 5.4 and 8.8 mg.

Discussion

The clinical and metabolic effects of aspirin in this patient are identical with those previously reported (Reid, Watson, and Sproull, 1950). The effect of aspirin on pyrexia, tachycardia, E.S.R., and haemoglobin level compares favourably with that reported for cortisone. The two substances have the same effect on fluid, chloride, and nitrogen balance and on plasma protein. The similarity is further strengthened by the development under aspirin therapy of side-effects suggesting a mild Cushing's syndrome.

If aspirin and cortisone have a similar action certain important considerations arise. Aspirin may stimulate the adrenal cortex to produce cortisone or may act in this way via the pituitary and the secretion of A.C.T.H.; or the two substances may have an identical peripheral action. Aspirin and cortisone appear to differ in one respect. The former produces a respiratory alkalosis, while the latter causes a fixed base alkalosis. This discrepancy may be explained by the great difference in therapeutic dosage of the two substances. The comparatively large doses of salicylate lead to accumulation of the drug in the plasma, displacement of equivalent amounts of bicarbonate, and a raised plasma *p*H (Reid, Watson, and Sproull, 1950). As plasma *p*H depends on the ratio H_2CO_3 : $NaHCO_3$, any reduction in bicarbonate must be accompanied by an equivalent reduction in the concentrations of plasma H_2CO_3. This may be achieved by increasing alveolar volume, which lowers alveolar CO_2 concentration and

therefore plasma H_2CO_3. The clinical counterpart of this physiological adjustment is the slow deep breathing on salicylate administration.

It is realized that a single case has been cited as evidence of a possible common action of aspirin and cortisone, but on examination of our records of previous cases of acute rheumatism treated with sodium salicylate we find that frequent reference is made to puffiness of the face and acne-like lesions on the face, front of chest, and back. In fact, puffiness of the face may be observed in almost every patient receiving full therapeutic doses of salicylate, and it tends to be most pronounced in children. Most of these patients also had a reducing substance in the urine which was assumed to be a salicylate fallacy. However, addition of salicylic acid, sodium salicylate, and aspirin to normal urine in concentrations greater than we have ever encountered in the urine of patients under treatment failed to show any reduction of Benedict's solution. This does not exclude the presence of reducing substances other than glucose, but it may well be that the reductions previously observed were partly if not wholly due to glucose. These retrospective observations suggest that the development of mild Cushing's syndrome during intensive salicylate treatment is not uncommon, but there are many points requiring further investigation before any final conclusion may be drawn. Nevertheless, it is thought that this initial report is justified in view of the significance of the findings.

Summary

The clinical and metabolic effects of aspirin in the treatment of acute rheumatism resemble closely those attributed to cortisone.

A case is presented, and others referred to, in which the similarity in action of the two substances is further strengthened by the development under aspirin treatment of side-effects suggesting a mild Cushing's syndrome.

The effects observed were rounding of the facial contours, acne, diminished glucose tolerance, glycosuria, and alteration of the mental state.

Some important considerations arising out of this conception are discussed.

We thank Professor J. W. McNee for his advice and generous help in providing facilities for this work. We are also indebted to Mr. S. L. Rae for the ketosteroid estimations.

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The British Standards Institution has issued a British Standard for one-mark bulb pipettes. Sixteen sizes of pipette from 1 ml. to 100 ml. capacity are specified, being those most in demand for general laboratory use. Full dimensions are given, but, in accordance with current practice in British Standards for laboratory glassware, only the essential ones are listed as mandatory, the remainder being given for the guidance of manufacturers. Standard methods are included for the determination of capacity and delivery time, and tolerances listed for both. An appendix gives the sizes of glass tubing recommended for the manufacture of these pipettes. Copies of this standard may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1 (2s. post free). The Institution has also issued standards for hospital beds and other hospital equipment, and for paper boxes for pills, creams, powders, pastes, etc.

EVALUATION OF TREATMENT IN INTERMITTENT CLAUDICATION*

BY

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Arteriosclerosis is by far the commonest cause of intermittent claudication, and numerous drugs and operations have been advocated for the treatment of this condition. Any effective treatment must increase the distance a patient can walk, either by increasing the blood flow to the affected muscles or by reducing the pain which occurs on exercise.

Direct measurement of the distance a patient can walk is the common method of assessing treatment. This has two disadvantages. First, if improvement does occur it is impossible to say whether this is due to an increased blood flow to the muscles or to a pain-relieving action of the drug. Secondly, it does not allow the limbs to be tested separately. Often both legs are affected by the disease, but the earlier onset of pain in the more severely affected one may stop the patient walking before pain is felt on the other side.

An alternative method for evaluating treatment is described which does not suffer from these disadvantages.

Methods

The method employs an ergograph to determine the amount of work a patient can perform and a venous occlusion plethysmograph to enable the blood flow through the calf to be measured after the exercise.

The ergograph has already been briefly described (Shepherd, 1950). The patient, by depressing a footboard on plantar flexion, raises a weight. The footboard is so arranged that the axis of its movement passes through the ankle-joint (Goetz, 1942) and, as the leg is kept horizontal, with the knee flexed through an angle of about 60 degrees, the posterior calf muscles perform most of the work.

On the return stroke, as the ankle is dorsiflexed, the speed of the falling weight is controlled by a brake (Fig. 1). Alternate contraction and relaxation of the muscles is therefore possible, the posterior calf muscles being relaxed on dorsiflexion instead of having to resist the descent of the weight. This is important, because it leads to a large difference between the amount of work that can be done by the normal and the arteriosclerotic subject. The normal adult male of whatever build can make 500 contractions at a rate of 24 a minute and show no sign of fatigue or pain at the end. The number of contractions that can be made by arteriosclerotics with symptoms of claudication varies according to the severity of the disease, but even mild cases are generally forced to stop by pain and fatigue in the affected muscles before they have completed 200 contractions. The ergograph could also be adapted for testing the extensor muscles of the leg so that work is performed on dorsiflexion only. In practice this has never been done, as in all our patients pain on exercise was limited to the posterior calf muscles. The movement of the foot-board is transmitted to an indicator. A mark is placed on a scale behind the indicator, and by pushing to this mark the footboard moves through an angle of 33 degrees and the subject lifts a 5.5-kg. weight a distance of 26 cm. By arranging

*This work was carried out during tenure of a British Medical Association scholarship.

the pointer of a metronome to move parallel to this indicator the subject, guided by the metronome, works at a constant rate. This allows accurate comparisons to be made.

Blood flows are recorded through the calf of the leg after exercise by means of a light celluloid plethysmograph (Shepherd, 1950) applied to the leg before exercise. Grant (1938) pointed out that any material departure from the resting forearm blood flow after local exercise can be attributed to a change in muscle circulation. It is probable that the same is true of the calf, and that recordings made after exercise represent mainly muscle blood flow. With the technique described, the first recording can be started within a second of the cessation of exercise.

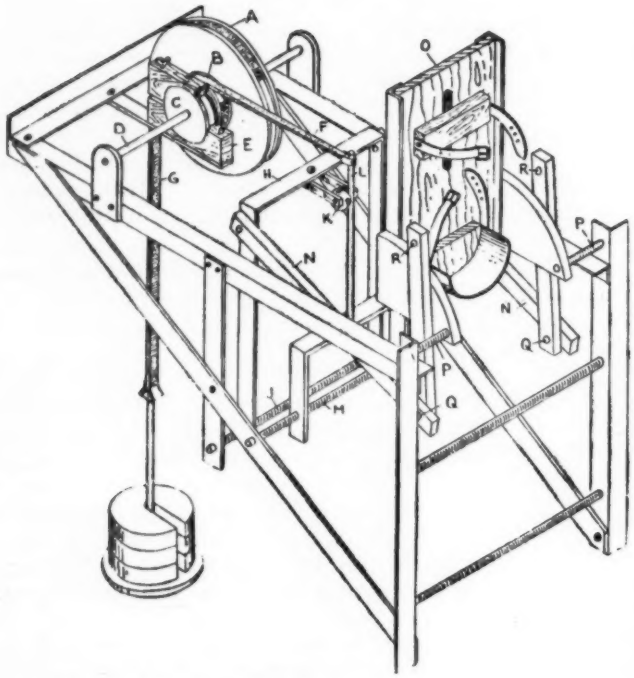

FIG. 1.—The ergograph. Framework made from light angle-iron and attached to the end of a couch so that the machine overhangs one end. Pulleys A, B, and C are mounted on axle D. Pulleys B and C are connected through a free-wheel device free from back-lash; A and B are permanently fastened together. A wooden block E encircles pulley C and the frictional force can be adjusted by means of two wing nuts. The brake-block is shown cut away to enable pulleys to be seen. The foot is strapped to the footplate O; the plate swings about the axles P. The footplate and attachments are counterbalanced by a weight not shown.

As the foot is plantar-flexed the connecting rods N move towards the right and pull lever H, which can swing about axle J, also towards the right. Roller K, attached to lever H, pushes to right a second lever L, swinging about axle M. A leather belt F, one end attached to lever L, passes round and is fastened to pulley B. As lever L moves to right the belt causes pulley B to rotate, and with it pulley A. Pulley C is kept stationary by means of the brake-block. A second belt G, one end attached to pulley A, carries a hanger on which the 5.5-kg. weight is placed. The rotation of A causes the weight to be raised.

On the return stroke, as the foot moves backwards and the weight falls, all three pulleys move together, the speed of the falling weight being controlled by the brake. This enables the foot to return to the dorsiflexed position without any force being exerted on it by the falling weight, since levers H and L can move independently.

Results

Observation of the number of contractions that a subject can make on the ergograph, working at a rate of 24 contractions a minute, with the limb circulation both free and occluded, combined with a study of the calf blood flow after exercise, enables the deficiency of the circulation to the muscles to be assessed.

In the occasional case in which the cause of the pain is in doubt this procedure may enable vascular deficiency to be ruled out. The following case is an example.

A man aged 49 complained of having had attacks of cramp in the left calf for two and a half years. He was able to make 500 contractions without pain or fatigue. The plethysmographic record showed normal pulsations. The immediate post-exercise flow was 23.2 ml. per 100 ml. calf a minute, and this was followed by a return to the resting level in two minutes. In addition, when exercise was carried out with the circulation occluded by a thigh cuff inflated to 200 mm. Hg. which was released just before the first-post-exercise recording, the immediate flow was 33.4 ml., indicating that a considerable potential reserve was available (Fig. 2). This is a normal response to these tests.

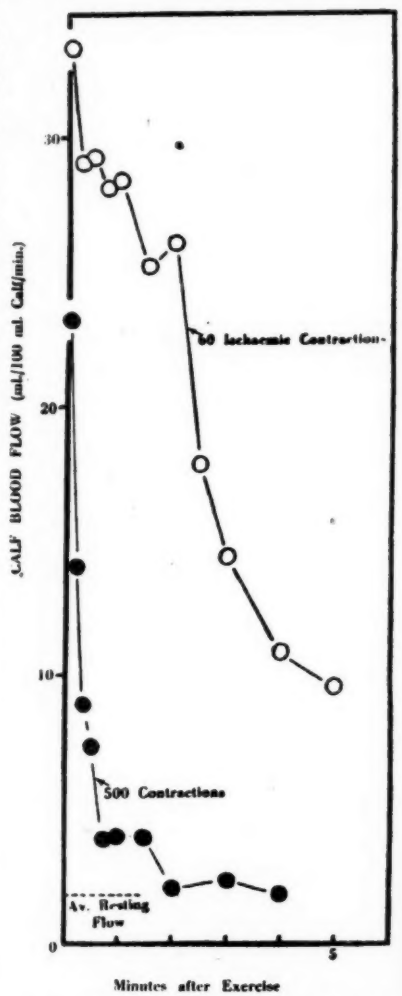

FIG. 2.—Patient aged 49. Normal pattern for the calf circulation. Normal pulsations on plethysmogram. 500 contractions of left calf without symptoms. Initial high flow with a rapid recovery to resting level. With 60 ischaemic contractions of left calf the immediate post-exercise flow is higher than with 500 normal contractions, indicating the potential reserve available.

The pattern of the calf blood flows after exercise in patients with arteriosclerosis and symptoms of intermittent claudication falls into two main groups (Shepherd, 1950).

Group A.—The plethysmographic record shows pulsations, but they are usually smaller than in normal subjects. The immediate post-exercise flow is lower than in the normal individual, and the flow subsequently declines very slowly to the resting level (Fig. 3). Ischaemic exercise carried on to claudication does not increase the post-exercise flow.

Group B.—The plethysmographic record shows either very small pulsations or none at all. The immediate post-exercise flow is much lower than in the normal subject, but instead of declining slowly to the resting level it gradually increases to a maximum some time after the cessation of the exercise and then declines to the resting level. The maximum level reached in these cases is invariably much less than the immediate post-exercise flow in normal individuals (Fig. 4). This pattern and the initial flow are unchanged if the exercise is carried out with the circulation arrested in the leg.

Treatment of Intermittent Claudication with "Padutin"

Werle and Multhaupt (1937) found that the injection of padutin, an insulin-free pancreatic extract, caused an

increase in the skin temperature of the fingers. On the other hand, Abramson *et al.* (1941) found no change in the resting blood flow to the hand, leg, or forearm after the intramuscular injection of four biological units. Allen *et al.* (1946) state that the exact mechanism of relief of the pain of claudication by tissue extracts is not well understood, but that the extract seems to prevent in some way the chemical changes which produce pain in exercised ischaemic muscles.

In the present experiments the effect of padutin has been tested on eight male patients with arteriosclerosis whose ages ranged from 44 to 57 years, average 52. The primary complaint in all cases was intermittent claudication. None were diabetic, and the skin in all cases was healthy. The calf blood flow after exercise showed a Group A pattern in four, and a Group B pattern in four. Treatment lasted from 12 to 21 weeks, average 16.

The general routine was as follows. The patient made five visits before any treatment was started. On the first visit he practised on the ergograph in order to become familiar with the exercise, but no observations were made. At each of the following four visits the claudication index and the calf blood flow after exercise were measured. By claudication index is meant the number of contractions the patient could make before pain and fatigue in the affected muscles forced him to stop. Owing to the dependence of the claudication index on the determination of the subject, it was thought desirable to have four baseline observations.

The drug was given by weekly intramuscular injection: usually 1 ml. (three biological units) weekly for the first two weeks, then 2 ml. weekly until the last four weeks, when the dose was usually increased to 3 ml. In addition, the patient took the drug by mouth (10 biological units per ml.): 10 drops three times a day for the first two weeks, then 20 drops increased to 30 drops in the last four weeks. The claudication index and post-exercise calf blood flows were usually determined at weekly or occasionally fortnightly intervals throughout the period of treatment. Recordings were made about 15 minutes after the injection, but in some cases were also made before the injection was given, in order to rule out the possibility of the injection itself reducing the claudication index. No undesirable symptoms were reported.

In neither group was there any evidence that the drug relieved the claudication or increased the calf blood flow after exercise. Fig. 3 shows the post-exercise calf blood flow before and at the end of treatment in a patient with a Group A pattern. The pattern and the extent of the blood-flow response were unchanged and the average of the four determinations of the claudication index before treatment was not materially different from that at the end of treatment. Fig. 4 shows the post-exercise calf blood flow in a patient with a Group B pattern before and after treatment. The results of all the tests on this patient are shown in Fig. 5. It will be noted that there is no marked change in the calf blood flow or claudication index during the treatment.

It was often difficult to reconcile the patient's own assessment of changes in his condition with the objective measurements in the laboratory. Some patients thought they were improved about the middle of treatment, and two said that they could walk a mile whereas formerly they could walk only 200 yards. All, however, at the end of treatment felt there was no substantial improvement. Even during the time of alleged improvement the laboratory measurements showed no increase in claudication index or post-exercise blood flow.

All the patients smoked from 8 to 35 cigarettes a day, the average consumption being 20. Four ceased smoking for almost two months during treatment, with no important difference in their claudication index or their calf blood flow after exercise. Four patients, at one of their tests, smoked a cigarette and inhaled the smoke during exercise, with no change in the calf blood flow or the number of contractions carried out. In seven of these eight cases treated with padutin the circulation through the other calf was tested. Four showed a normal response, two a Group A response, and one a Group B response (Fig. 6).

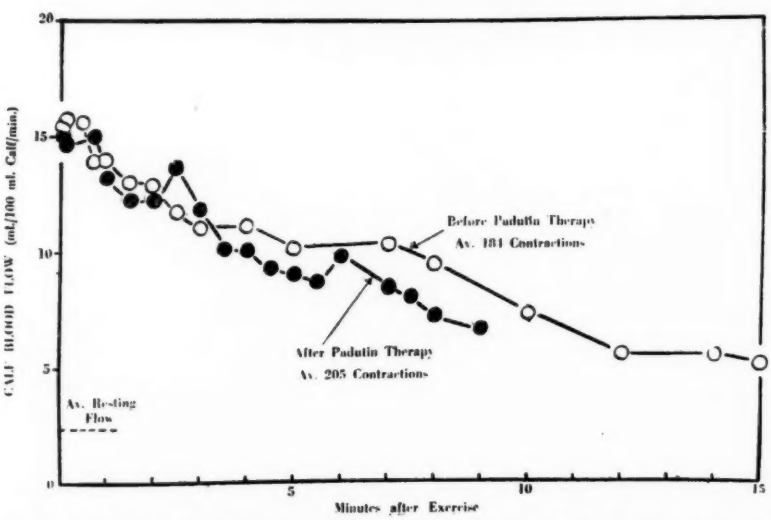

FIG. 3.—Group A pattern. Post exercise calf blood flow before and after 14 weeks' treatment with padutin in a patient aged 44. No change in blood flow and little alteration in number of contractions that can be made on the ergograph.

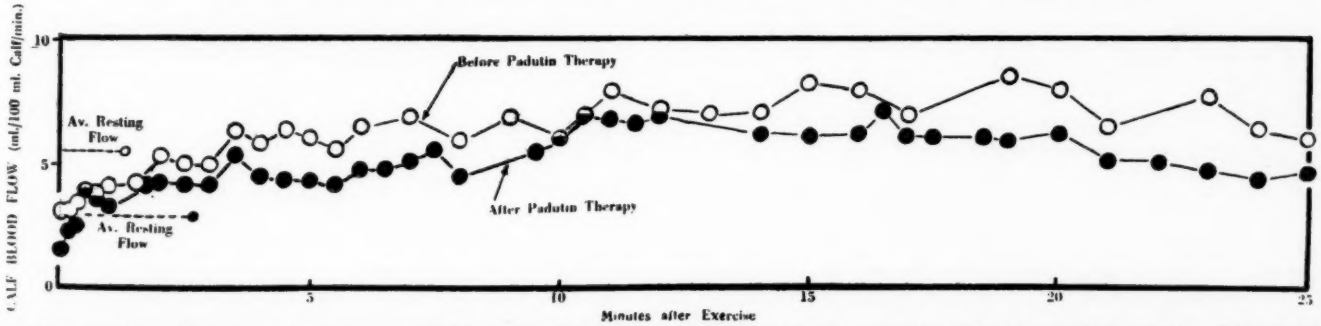

FIG. 4.—Group B pattern. Post-exercise calf blood flow before and after 20 weeks' treatment with padutin in a patient aged 55. There is no increase in blood flow as a result of treatment. Note that in this case the immediate post-exercise flows are lower than the average resting flows.

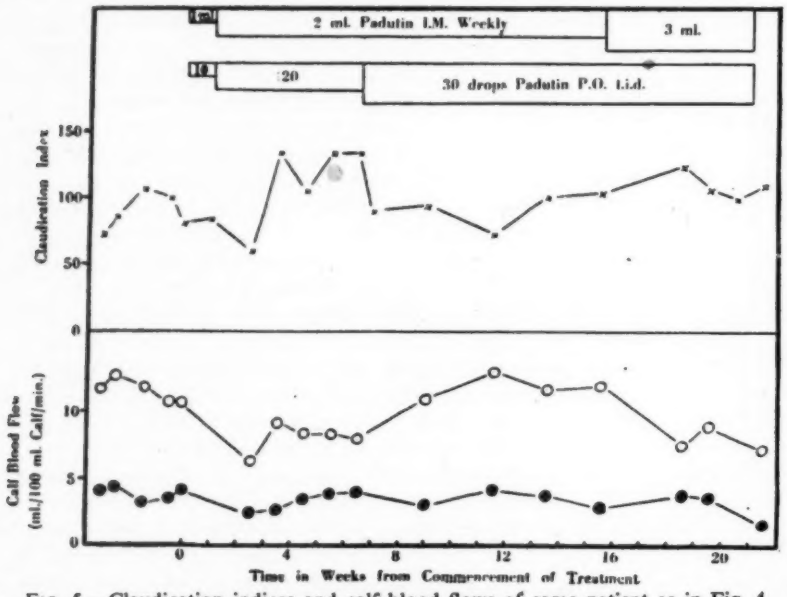
2 ml. Padutin I.M. Weekly
3 ml.
20
30 drops Padutin P.O. t.i.d.
Claudication Index
Calf Blood Flow (ml./100 ml. Calf/min.)
Time in Weeks from Commencement of Treatment

FIG. 5.—Claudication indices and calf blood flows of same patient as in Fig. 4. Black circles represent immediate flow after the exercise, and the open circles the maximum flow attained. The amount of padutin given is shown at the top of the figure. This patient received the maximum dose for a longer period than the average.

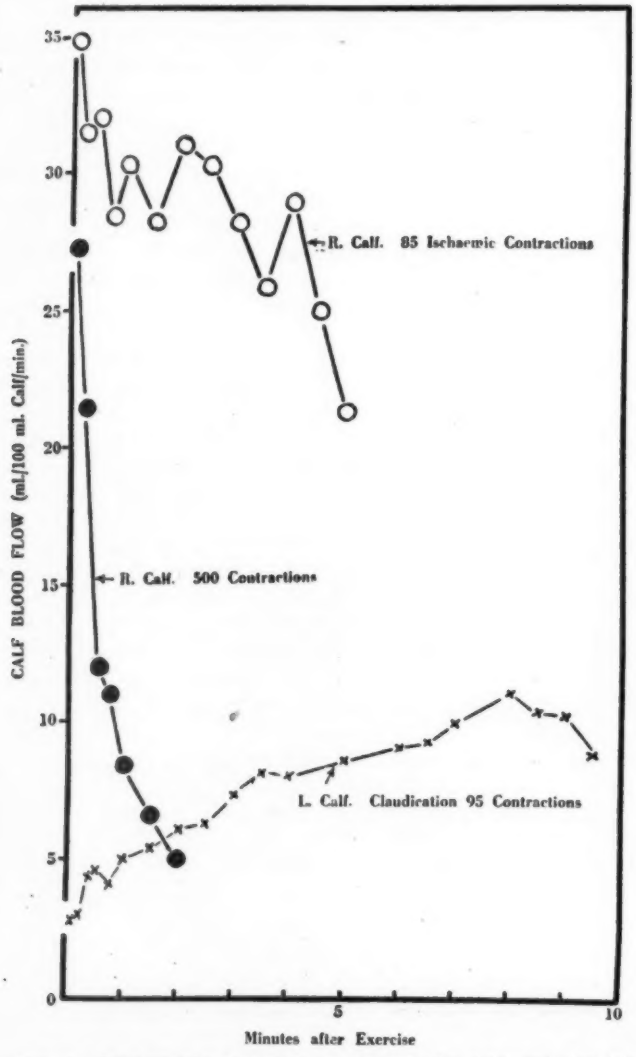
R. Calf. 85 Ischaemic Contractions
R. Calf. 500 Contractions
L. Calf. Claudication 95 Contractions
CALF BLOOD FLOW (ml./100 ml. Calf/min.)
Minutes after Exercise

FIG. 6.—Post-exercise blood flows through the right and the left calf of same patient as in Figs. 4 and 5. Right calf shows a normal response, left calf a Group B response.

Prediction of the Effects of Sympathetic Neurectomy

In a series of 10 cases of arteriosclerosis with a healthy skin, whose primary complaint was claudication, an attempt was made to determine the effect of acute release of sympathetic control on the calf blood flow after exercise. Five of these cases had a Group A response to exercise, and five a Group B. Two methods were used. In the first the claudication index and the post-exercise calf blood flow were measured before and after heating the subject by wrapping him in blankets and immersing one arm in stirred water at 43° C. (Gibbon and Landis, 1932). Heating lasted one hour, unless the resting calf blood flow reached a steady maximum sooner. In the second method the claudication index and the calf blood flow after the exercise were first determined, and, after allowing one hour for recovery, the subject was asked to make the same number of contractions, during the last 18–24 of which 500 mg. of tetraethylammonium bromide (T.E.A.B.) (Acheson and Moe, 1945, 1946) was injected intravenously. The calf blood flow was again determined immediately after the exercise. This procedure was used because of the brief action of T.E.A.B.

In four patients both these methods were used on separate occasions, in three T.E.A.B. only, and in three indirect heating only. In no case did either method increase the calf blood flow after the exercise, nor did indirect heating increase the claudication index.

Effects of Lumbar Sympathectomy

Eight cases have been examined before lumbar sympathectomy, including three from the series just described. Four of these were in Group A and four in Group B. These patients also were non-diabetic and had healthy skins; their primary complaint was of intermittent claudication. Five had one cold foot, but the skin temperature of the toes of this foot rose to 31.5–34.5° C. in response to indirect heating (Gibbon and Landis, 1932). The other three also showed a similar rise on the more affected side.

After lumbar sympathectomy there was in no case any conclusive evidence of improvement either in calf blood flow after exercise or in the claudication index. Fig. 7 shows, for example, the blood flow before and eight weeks after sympathectomy in a patient with a Group A response. The blood flow was also determined at 5, 14, and 19 weeks after the operation, with similar results. The claudication index averaged 77 before and 79 after operation. A typical patient who showed a Group B response made 173, 120, 150, and 150 contractions 7, 8, 8½, and 9 weeks after the operation respectively, whereas his previous best was 140 contractions. There was no improvement in his calf blood flows in any post-operative test (Fig. 8). All these patients said that their exercise tolerance had not been improved by the operation.

Discussion

In order to assess any treatment of intermittent claudication it is desirable to study both the claudication index and the calf blood flow during exercise. The latter may bear no relation to the resting calf blood flow, so that the demonstration of an increase in resting calf flow is of no significance. The flow immediately after exercise is probably similar to that during the relaxation periods in exercise.

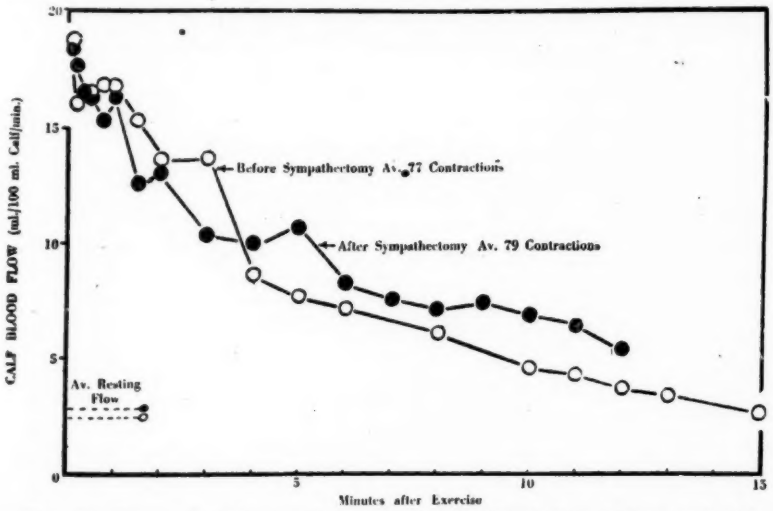
CALF BLOOD FLOW (ml./100 ml. Calf/min.)
Before Sympathectomy Av. 77 Contractions
After Sympathectomy Av. 79 Contractions
Av. Resting Flow
Minutes after Exercise

FIG. 7.—Group A pattern. Post-exercise calf blood flow before and eight weeks after removal of the first, second, and third lumbar ganglia in a patient aged 50. Similar flows were obtained 5, 14, and 19 weeks after operation. Skin temperature and skin resistance of foot after sympathectomy showed no change in response to indirect heating carried out by immersing the hand, forearm, and as much of the arm as possible in a stirred water-bath at 44° C. In view, however, of the findings of Boyd and Monro (1949) it is unlikely that all the vessels in the leg were completely denervated.

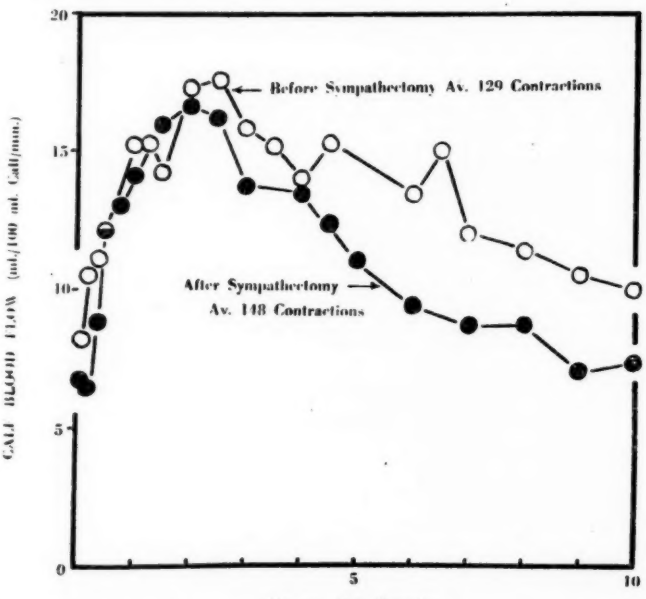

FIG. 8.—Group B pattern. Post-exercise calf blood flow before and eight weeks after sympathectomy in a patient aged 47. Similar flows were obtained seven and nine weeks after operation.

It is a much better, though still indirect, index of the blood flow during exercise than is the resting blood flow. It can also be determined simply and with precision. For these reasons its use is recommended, and it has been employed in this work. The ergograph does not, of course, exactly reproduce normal walking conditions, but it allows the blood flow to be measured after standardized exercise. To do this after walking involves some delay.

The values obtained for the claudication index were not constant for any one patient but varied somewhat on different occasions. In order to reduce these differences as much as possible it is essential for the subject to have a preliminary practice on the ergograph. After becoming familiar with the exercise his claudication index should be determined on at least four separate occasions. It is important to tell him to carry on until compelled to stop. The knee must be kept at the same angle throughout the series, because when it is more extended the subject is often able to perform many more contractions.

On pooling all results, 95% of the claudication indices and immediate post-exercise calf blood flows before treatment lay between 38% and 17% respectively above and below the mean for each individual. Any increase that was less than these values after treatment cannot be considered significant. The stage of the disease did not seem to affect the range of variation, in the same individual on different occasions, of either the claudication index or the immediate post-exercise blood flow. There was no evidence in any of the patients tested in the present series that padutin or lumbar sympathectomy caused a significant change in the claudication index or the immediate post-exercise calf blood flows.

The patients' own statements during treatment are occasionally misleading. They may, in an attempt to convince themselves that they are getting better, go further by walking more slowly, or overestimate the distance walked, or drive themselves further in spite of pain. For instance, four of the patients in the middle of their course of treatment with padutin said that their walking distance was increased, but their claudication index was found to be unchanged.

Since the condition may be progressive, the fact that the claudication index and the calf blood flow after exercise remained more or less unchanged during padutin treatment might indicate that this drug prevented a deterioration in the patient's condition. Before beginning treatment two of the patients were examined for four and six months respectively, during which time there was no deterioration in the calf blood flow after exercise. However, to obtain definite evidence on this point it would require two large groups, one acting as a control.

If during treatment there had been any definite evidence of improvement in the claudication index in these patients without a change in the calf blood flow following the exercise, it would have been necessary to control the results by treatment with a placebo in order to rule out the possibility of psychological improvement. As no improvement was found, this was not thought to be necessary.

The tests described with indirect heating and T.E.A.B. may be useful in assessing whether sympathectomy can be expected to cause at least a temporary (Barcroft and Walker, 1949; Lynn and Barcroft, 1950) increase in the calf blood flow immediately after exercise. Three patients who had no increase of their post-exercise calf blood flow during heating or after T.E.A.B. also had no increase after sympathetic neurectomy.

Finally, these results deal only with claudication and the calf blood flow, not with the effect of padutin or sympathectomy on the temperature or circulation of the foot. All but one of the sympathectomized patients had a warm foot after the operation, and five of them felt that this made it worth while.

Summary

A method is described in which an ergograph and a light celluloid plethysmograph were used to measure the claudication index and the post-exercise blood flow through the calf.

The use of this method in the evaluation of treatment in intermittent claudication is discussed.

In eight cases of arteriosclerosis in which the primary complaint was intermittent claudication, padutin, administered both by mouth and by intramuscular injection over periods of 14–21 weeks, had no effect on the claudication index or the post-exercise blood flow through the calf.

Eight cases of arteriosclerosis with claudication examined before and at varying times after sympathetic neurectomy showed no evidence of improvement in the claudication index or the post-exercise blood flow through the calf.

I would like to thank Mr. E. J. Finnan, M.Sc., of the Department of Civil Engineering, Queen's University of Belfast, who designed and constructed the ergograph; also the patients, who willingly co-operated. I would also like to thank Messrs. Bayer Products, Ltd., for their co-operation and for the supplies of padutin.

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INTRAMUSCULAR HEPARIN

BY

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It is generally considered that heparin is the most efficient and the safest anticoagulant in common clinical use. However, satisfactory therapy with this drug has hitherto necessitated frequent intravenous injections, which are irksome to both patient and doctor. Since heparin cannot be given by mouth, a method of administration which avoids the intravenous route and decreases the frequency of injections would have obvious advantages. Attempts to achieve this have been made in the past with various preparations of "depot" heparin, incorporated in Pitkin menstruum or other media. These have not proved completely successful.

A concentrated aqueous solution of heparin, 25,000 units per ml., for intramuscular injection has recently come on the market. This paper describes trials with this preparation carried out on 20 cases at the Institute of Cardiology.

Methods

All clotting times were determined by the method of Dale and Laidlaw (1911–12). Objections have been raised to this test, since it employs capillary blood. However, most authorities agree that all methods of estimating clotting time are unsatisfactory, and that techniques employing capillary blood are no more inaccurate than those in which venous blood is used. Moreover, the Dale and Laidlaw method is easy to carry out, gives an excellent end-point, and avoids the necessity for repeated venepuncture on the same patient. It was therefore admirably suited to the present type of study. The normal clotting time determined with this technique is two and a half to three minutes.

It was necessary to establish a criterion for adequate anticoagulation when using this method. This was done by injecting a standard dose of heparin intravenously into normal subjects and measuring by Dale and Laidlaw's method the extra time before clotting occurred.

Fig. 1 shows the average delay of clotting at ten-minute intervals in 16 normal subjects following the intravenous injection of a standard dose of heparin. The dose used was 100 units per kilogram body weight, and in a subject of average weight this amount approximates to a therapeutic dose. The shape of the curve in Fig. 1 should be particularly noted. The sharp rise following injection and the abrupt descent show that the drug is eliminated rapidly from the blood stream when given intravenously. After one hour the delay of clotting was two minutes. It was felt that a satisfactory blood level of heparin should exist for one hour after the intravenous injection of a therapeutic dose, and accordingly this was the criterion for adequate anticoagulation adopted in this work.

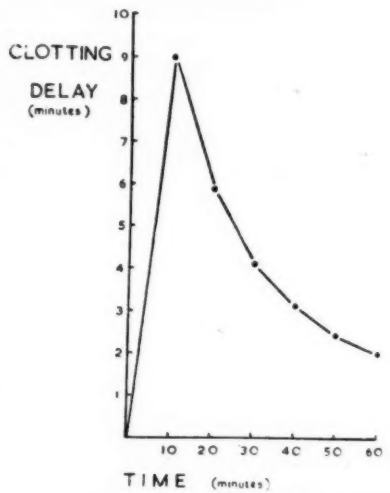

FIG. 1.—Average curve obtained in 16 normal subjects after an intravenous injection of 100 units of heparin per kg. body weight. Delay of clotting = actual clotting time minus control clotting time.

Results

The usual dose of heparin when given intravenously is about 30,000 units a day. It was reasonable to suppose that intramuscular injection would demand higher dosage, and trial and error showed that a single dose of 35,000 to 40,000 units given intramuscularly would delay clotting satisfactorily for twelve hours. The results obtained were extremely uniform, with only minor variations from patient to patient.

Fig. 2 shows the curves from two patients. After a single intramuscular injection of 37,500 units of heparin (1.5 ml. of solution) the delay of clotting has been plotted for twelve hours. Both these curves differ markedly from that obtained following intravenous injection (Fig. 1). With intramuscular injection, clotting is never considerably prolonged even in the initial stages, and the anticoagulant effect is very well maintained. This would seem to show that the drug is absorbed from muscle at a constant

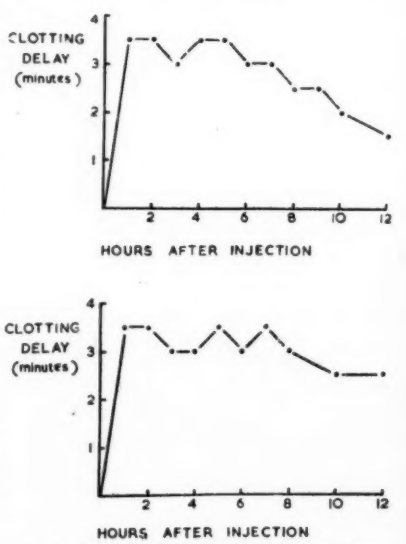

FIG. 2.—Clotting delay in two patients, followed for twelve hours after an intramuscular injection of 37,500 units of heparin.

rate. Even after twelve hours the delay of clotting is still adequate when judged by the criterion previously stated.

The problem of long-term anticoagulant therapy with intramuscular heparin was also studied in the same way.

Fig. 3 shows the dosage of heparin and the delay in clotting times in one patient over a period of four days. An initial dose of 37,500 units of heparin was given intramuscularly, followed by injections of 25,000 units (1 ml. of solution) twelve-hourly. The delay of clotting was satisfactory

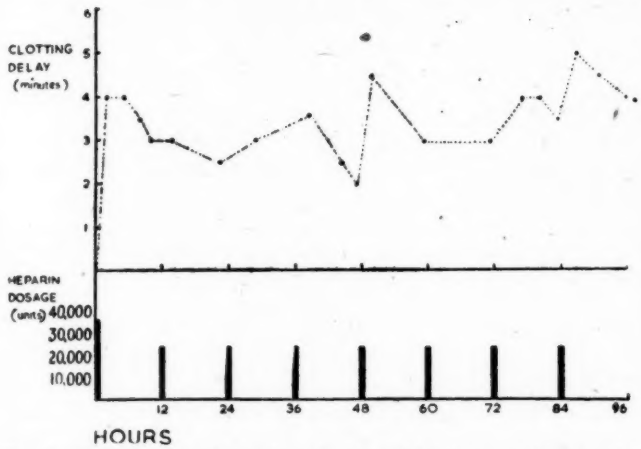

FIG. 3.—Long-term anticoagulant therapy with intramuscular heparin.

throughout and there was some indication that the dosage of heparin could be decreased after the initial stages. This was shown by the increase in the delay of clotting after the first two or three days. It therefore seems probable that either the dosage of heparin may be decreased after this time or the time interval between injections may be increased.

Discussion

There are some disadvantages to the intramuscular injection of heparin. It was at first found that the injection was attended in some patients by local pain. This, however, was satisfactorily overcome by the simultaneous injection of procaine : 1–1.5 ml. of a 1% solution of procaine should be given in the same syringe as the heparin. This has no effect on the action of the drug and considerably diminishes the pain.

The discomfort of the injection may also be ameliorated by injecting into the vastus lateralis muscle, and not into the buttock upon which the patient has to lie.

Very occasionally a haematoma may develop at the site of injection. This is not a common complication, and was encountered only twice during the course of this work. Bauer *et al.* (1950) reported five significant haematomata in a series of 41 patients treated with intramuscular heparin. These workers used large needles for the injection, presumably because of the consistence of their heparin solution. The heparin solution used in the present work was aqueous, and so this disadvantage was overcome. Indeed, a fine needle, 18–20 gauge, should be used, and not the ordinary intramuscular needle. In this way the possibility of trauma is reduced to a minimum, and haematomata can usually be avoided. Elaborate precautions are unnecessary when making the injection, but care should always be exercised.

Hitherto, treatment with anticoagulant drugs has almost invariably demanded admission of the patient to an institution. This has been rendered necessary by the numerous intravenous injections required for heparin therapy, and by the frequent laboratory tests which must always be done to control dicoumarol dosage. Neither of these factors need be considered when heparin is given intramuscularly. The clotting time is never grossly prolonged, and the risk of haemorrhage is extremely slight. The results obtained in this investigation indicate that the treatment may be conveniently and safely carried out in the home. If this conclusion is confirmed by subsequent work, the use of an anticoagulant in domiciliary practice would constitute a significant advance for both patient and doctor.

Summary and Conclusions

The possibility of giving heparin by intramuscular injection has been studied in 20 patients. A concentrated aqueous solution of heparin of strength 25,000 units per ml. was used. Results indicate that this is a satisfactory method for short-term or long-term anticoagulant therapy.

An initial dose of 1.5 ml. of this solution followed by 1 ml. twice daily is recommended as a scheme of dosage.

Local pain and occasional haematomata which may result are discussed, and the way in which these disadvantages may be prevented or minimized is indicated.

I wish to thank Dr. Paul Wood, Director of the Institute of Cardiology, for his advice and encouragement, and the physicians of the National Heart Hospital for permission to carry out this work on patients in their care.

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ANAESTHESIA IN THE NEWBORN*

BY

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The newborn infant differs so greatly from the adult in his anatomy and physiology that the approach to anaesthesia in the two groups must be quite different. In the past there has been a tendency to adapt to infants those methods of anaesthesia which have proved to be of value in adults. The time has come to consider the problem of anaesthetizing the newborn in relation to their peculiar physiology.

During early life the ribs of an infant are disposed almost horizontally when the infant is in the erect position. Movements of the ribs can therefore produce only insignificant effects on the capacity of the thoracic cage, and costal respiration is practically impossible.

The Neonatal Lung

In addition to the relatively poor mechanism for its ventilation, the neonatal lung itself is a comparatively rudimentary structure. The area available for respiratory exchange is small in comparison with that of the adult lung: the amount per cubic centimetre of lung volume is half that of adult lung tissue, and the respiratory surface of the lungs per kilogram of body weight is about one-third that of the adult (Engel, 1947). To compensate for these deficiencies, as well as for the high oxygen consumption per kilogram of body weight, the infant has a rapid respiratory rate.

The infantile tracheo-bronchial tree is to some extent adapted to function in these circumstances, and the area of

*Read to the Section of Anaesthetics at the Annual Meeting of the British Medical Association, Liverpool, 1950.

the cross-section of the trachea of the newborn infant per unit of lung volume is twice that at 12 months. The sagittal diameter of the trachea of the neonatal infant is variously quoted as 3.6 to 5.7 mm. and of the adult as 15 to 20 mm. The diameter of the adult trachea is four to five times greater than that of the infant. If the forces governing the rate of flow of gases through the trachea follow Poiseuille's law, it would follow that an increase in the rate of flow in the child's trachea would produce an effect on the resistance to respiration 4^4 times greater than the increase in resistance produced by the same increase in the rate of flow through the adult trachea. In other words, if an increase in the rate of flow through an adult trachea increases the resistance to respiration by, say, x, the same increase in the flow rate through an infant's trachea would increase the resistance by $256x$.

On theoretical grounds, then, it is desirable that any technique employed for anaesthetizing young babies should not tend to increase the respiratory volume per minute, and should, if possible, reduce the amount of mechanical energy required for pulmonary respiration.

In addition to these mechanical differences between adult and neonatal respiratory systems, there seem to be certain differences in the sensitivity of the respiratory centre. The experiments in which Snyder and Rosenfeld (1937) observed the activity of the respiratory centres of post-mature foetal rabbits showed that smaller reductions in blood carbon-dioxide levels were required to produce acapnia in the young animals than in the maternal animals.

The immature state of the neuromuscular system in the newborn eliminates some of the problems which are met with in adult anaesthesia. The adult type of reaction to the irritation of an endotracheal tube under light anaesthesia is not seen in infants. The so-called "bucking" is impossible in children under 3 months of age, because until this time the cervical muscles are not capable of raising the head from the pillow. The only sign of irritation of the trachea under light levels of anaesthesia is a disturbance in the rhythm of respiration.

Similarly, deep levels of anaesthesia or heavy curarization are not necessary to produce muscular relaxation, because muscle tone is virtually non-existent in the newborn. During abdominal operations on young infants, intrusion of the abdominal contents into the operative field is sometimes very troublesome, but factors other than muscle tone appear to be mainly responsible for this. The infant at birth has an abdomen adapted to accommodate an alimentary tract which is devoid of gas, and thereafter the intestines acquire their gaseous content. It would seem inevitable that this, combined with the purely diaphragmatic type of respiration, would produce protrusion of the gut through the wound on opening the child's abdomen soon after birth.

The relative absence of muscle tone in infants can easily be demonstrated by artificial ventilation of the lungs under light anaesthesia; in small babies it is possible to inflate the lungs by the application of surprisingly low pressures, in sharp contrast with the resistance to inflation which the adult patient exhibits under similar conditions.

This ease with which the neonatal lungs can be inflated, combined with the small reduction in blood CO_2 required to produce acapnia, permits easy control of the respiration in young infants. In this respect the behaviour of the lightly anaesthetized infant bears a striking resemblance to the curarized and anaesthetized adult. Control of the respiration is extremely desirable in infants because it relieves the respiratory muscles of their whole load, and in abdominal surgery does much to prevent the pushing out of the abdominal contents. There is one theoretical objection to this procedure—there must be a shift of the oxygen dissociation curve of the blood to the left, thus reducing the peripheral oxygen tension. Barcroft (1946), however, showed that in newborn mammals the arterial oxygen saturation is only 75%, because the permeability of the pulmonary alveolar walls to oxygen is lowered, and that high oxygen atmospheres are able to raise the saturation level. In neonatal anaesthetic practice, then, a high oxygen atmosphere would more than compensate for the shift in the dissociation curve produced by artificial hyperventilation.

Use of Muscle Relaxants

In the light of these observations it is necessary to consider the use of muscle relaxants in the newborn. In anaesthetic practice generally these drugs can be used to reduce the dose of anaesthetic agent required for the production of good operating conditions because: (1) they reduce respiratory movements and enable adequate ventilation of the lungs to be carried out by the intermittent application of positive intrapulmonary pressures, without the use of excessive pressures; (2) they produce muscular relaxation in the surgical field; and (3) they reduce the effects of irritation by endotracheal tubes.

In the newborn, as has already been shown, control of the respiration is easily obtained at light levels of anaesthesia without the use of relaxants: muscle relaxation does not appear to be of major importance in the production of good operating conditions, and the usual untoward effects of endotracheal-tube induction are not seen. On these grounds it can be said that the use of relaxant drugs in anaesthesia is contraindicated in the newborn patient, and I have abandoned these drugs in such cases.

In view of the desirability of keeping the patient's respiratory activity at minimal levels and the relative absence of muscle tone, cyclopropane would seem to be an ideal anaesthetic drug for neonatal patients. The type of respiration which it produces would minimize the pushing out of the abdominal contents by the movements of the diaphragm, and the lack of muscle-relaxing properties would not be disadvantageous. There are, however, certain other effects which, I feel, render it undesirable. During surgical operations there is undoubtedly a greater loss of blood from those patients who are anaesthetized with cyclopropane, and this becomes a point of major importance in choosing an anaesthetic agent for a patient whose total blood volume is 300–400 ml. Prolonged administration of this drug to very small infants seems to produce in the early post-operative period a shock picture comparable to that often seen after its use in adults. For these reasons I consider that cyclopropane has little value in anaesthesia for the newborn, and that diethyl ether is the principal anaesthetic agent of choice, provided that the respiratory effect is reduced by controlled respiration produced by hyperventilation.

Operative Risk

The operative risk in newborn infants at term is slight, but it increases rapidly during the first week of life. This is in part due to the fact that the continuance of the abnormal state which the operation is designed to rectify increases the risk in some cases, but there is evidence to show that the resistance of all newborn mammals to physiological abuse becomes reduced during early extrauterine life. Glass *et al.* (1944), in a series of experiments on rabbits, estimated their survival time when they were subjected to

complete anoxia at term and at various days after term, and found that if the survival time in minutes was plotted graphically against the age of the animal the curve showed a regular decline from 30 minutes at term to 2 minutes at 20 days.

In those cases in which there is obstruction at some level of the alimentary tract the impairment of respiratory function by the aspiration of regurgitated fluid increases with time, and reflects on the operative risk; but this can be minimized by continuous aspiration of the pharynx in the pre-operative period.

In general, it can be said that the optimum time to operate is during the first 24 hours of life, or at the earliest period at which the blood urea and the urinary chlorides can be brought to normal levels.

Premedication

Some authorities have recently recommended that premedication of very young infants with morphine should be done. Leigh and Belton (1948) suggest a dose of 1/400 gr. (0.16 mg.) of morphine for 7-lb. (3.2-kg.) babies. This treatment appears to facilitate the smooth maintenance of anaesthesia, and would seem desirable if respiration is not to be aided or controlled. It does, however, make the induction of anaesthesia by inhalation agents—a tedious process at best—a very prolonged procedure.

Atropine should be given in all cases, and a dose which can be used on all newborn cases is 1/200 gr. (0.32 mg.).

Endotracheal Intubation

There are certain anatomical differences between the largest of newborn infants and adults that produce greater technical difficulties in the former. The infant larynx occupies a higher position in the neck in relation to the vertebrae, and the axis of its lumen tends to pass forwards as well as downwards. With the descent of the larynx which takes place in later life the forward angulation disappears (Tucker, 1932).

The complication of endotracheal intubation in young children that is most to be feared is subglottic oedema, the danger of which following instrumentation was first pointed out by Chevalier Jackson. Gillespie (1939) says that this oedema is the result of streptococcal invasion of abrasions produced by trauma during laryngoscopy, and that if care is taken during inhalation the risk is negligible. In his own published series of 70 cases of children under 18 months he does not report one instance of this complication. I have not met any case of respiratory stridor, nor have I seen any evidence of laryngeal oedema at post-mortem examination, following endotracheal intubation of neonatal infants. On the other hand, necropsy has revealed varying degrees of tracheitis, including one case in which there was on the anterior wall of the trachea a small circular ulcer similar to those reported recently by Dwyer *et al.* (1949). These lesions do not seem to have contributed towards the fatal outcome in these cases.

The advantages to be derived from intubation are very great, in that the tube ensures a reliable airway and enables the lungs to be readily inflated, and is an invaluable insurance against the dangers of gastric regurgitation, which is very common in the obstructive group of cases.

Apparatus

If CO_2-absorption apparatus is used on the newborn the only suitable standard equipment is the ¼-lb. (114-g.) Waters type of absorber described by Cope (1947). This has certain inherent disadvantages which greatly impair its value. Despite the fact that it is designed to reduce dead space, those parts of the apparatus which lie between the patient's respiratory tract and the soda lime have a considerable internal capacity. When the absorber is connected to an endotracheal tube its positioning is difficult if a considerable length of tubing is not used between the endotracheal tube and the absorber.

During the operation the Ayre's T-piece is very much easier to handle than the Cope absorber, and the internal capacity between the gas inlet and the patient is very small, so that with adequate flows of gas rebreathing is minimal. Artificial ventilation may be carried out by attaching a double-ended bag (B.L.B. type) to the exhaust tube, the open end of which is fitted with a vulcanite tap. This tap can be adjusted so that the intermittent pressure applied to the bag expels the amount of gas required to maintain the equilibrium of the system.

Thoracic and Abdominal Operations

I have now adopted a routine technique based on the views set out in this paper for anaesthetizing newborn infants for thoracic and abdominal operations.

The child is brought to the theatre dressed in a gamgee jacket and bonnet, and with the limbs bound in cotton-wool. An intravenous drip is run into one leg, and in cases in which there is alimentary obstruction a tube is passed into the stomach or, when there is oesophageal atresia, to the site of the obstruction. The thoracic cases that are cyanosed are brought up in an oxygen tent, and are transferred to the operating table only when the induction of anaesthesia is about to begin. The child lies on an electric pad on the table.

Induction of anaesthesia is effected by leading gases from a continuous-flow machine to beneath a Schimmelbusch mask covered by a thick layer of gauze, and separated from the patient's face by a thick layer of gamgee tissue.

Initially the gas flow is at the rate of 2 litres of oxygen a minute, maintained for one minute. At the end of this time 100 ml. of CO_2 a minute is added, and, finally, ether vapour to the limit of the patient's tolerance.

When the child breathes the full vapour concentration of ether regularly, the largest possible endotracheal tube is inserted, and this is connected by the shortest possible length of rubber tubing to an Ayre's T-piece.

The gas flow is adjusted to give a 50% O_2 and N_2O mixture flowing at a total rate of 3–4 litres a minute, and the ether vapour is turned off until the child shows movement of the limbs. In the meantime the mouth is packed with sterile ribbon gauze and the endotracheal tube is fixed. Ether is added to the mixture in concentrations just high enough to prevent movement.

The patient is now placed in the correct position for the operation, and a double-ended bag is fitted to the exhaust limb of the Ayre's T-piece. When the incision is made the respiration is brought under control by intermittent positive pressure applied by squeezing the bag, and the child is kept from spontaneous breathing throughout the operation.

Anaesthesia is maintained at the lightest possible level, and in view of the difficulty of eliciting and interpreting the signs of anaesthesia in these cases the ether vapour is turned off at intervals of 20 minutes for a period long enough to allow a return of some movements of the limbs. In this way rapid recovery after operation is ensured.

The method has proved to be extremely satisfactory, and the babies appear to be in much better condition post-operatively than those in whom spontaneous respiration was allowed to continue throughout the operation, or in

whom deeper levels of anaesthesia were attained. There seems to be rather less bleeding, and the surgeon is unhampered by respiratory activity.

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OBSTETRIC ANALGESIA AND PLACENTAL INSUFFICIENCY

BY

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For the relief of pain in labour the combination of general medication and intermittent inhalation analgesia can be very effective and is suitable for all types of labour. Relief from pain is effectively obtained by careful antenatal preparation, by careful supervision during labour, by the judicious use of analgesic drugs such as pethidine, and by inhalation of a mixture that provides analgesia within 15 seconds. Success depends largely on the quality of the psychological management. The mother will be satisfied only if she appreciates the rationale of the method—that she will be aware of uterine contractions and will feel the baby delivered, but will not feel pain.

I closely supervised pain relief in a series of 200 labours, including 141 primiparae, selected at random but with every prospect of normal delivery. The patients had received no antenatal preparation for analgesia. Supervision and reassurance during labour were therefore exacting, but 89% admitted that analgesia was adequate. Subsequent experience has emphasized the well-known fact that antenatal preparation makes supervision in labour easier and more effective. Failure to obtain adequate analgesia has been due to lack of co-operation (or inadequate preparation for labour), to continuous backache at the end of the first stage of labour (needing higher dosage of analgesic drug), and to labour being well advanced on arrival in hospital.

In the 200 cases the inhaled mixture was either 0.5% trichlorethylene in air or 75% nitrous oxide with 25% oxygen, in both of which mixtures the oxygen content is at least as great as that of air. The commonly used 50% nitrous oxide with air provides only 10% oxygen: inhalation of such a mixture lowers the arterial oxygen tension to below 50 mm. Hg (McQuiston, Cullen, and Cook, 1943). This fall in tension is rapid. Examination with an oximeter (G. af. Geijerstam, 1949—personal communication) has shown that when a woman in labour inhales 4 litres of pure nitrous oxide in about 10 seconds the percentage saturation of her blood with oxygen falls from the normal 96% to 69% within 20 seconds, that is, to an oxygen tension of about 40 mm. Hg. The particular value of intermittent inhalation is to provide pain relief with negligible respiratory depression in the baby. It is important that the analgesic should not contribute to oxygen lack, which is a potent and insidious depressant of nervous function. The following considerations suggest that even intermittent inhalation of an oxygen-deficient mixture may contribute to intrauterine asphyxia when placental function is impaired.

Oxygen Transfer to Foetus

It is generally agreed that the passage of oxygen from mother to foetus is a matter of diffusion across the placenta, and that there is an oxygen-tension gradient towards the baby. Eastman (1930) has calculated that the probable oxygen tension in the placenta available to umbilical-vein blood during labour is 40–50 mm. Hg, compared with the 90 mm. Hg of maternal arterial blood. Whatever the actual figures may be, transfer is facilitated by devices such as an arrangement of vessels in the placenta whereby the streams of maternal and foetal blood run parallel but in opposite directions, so that umbilical-vein blood has maximum exposure to maternal arterial blood (Spanner, 1935); by the large numbers of foetal blood cells for oxygen transport (Windle, 1941); and by a difference in the oxygen dissociation curves of the two bloods which promotes the passage of oxygen across the tissue barrier. With a maternal arterial oxygen tension of 50 mm. Hg or less, the oxygen-tension gradient across the placenta is considerably reduced and possibly abolished.

There is little doubt, too, that a progressive decline in the saturation of the blood reaching the foetus takes place towards the end of gestation, and the point at which labour occurs is variable. Windle (1945) points out that, so long as normal healthy conditions prevail in the placenta, a reservoir of oxygen in combination with haemoglobin is present to provide for the needs of the foetus. This constitutes a factor of safety equivalent to at least 40 ml. of oxygen in the human at term, and enables the foetus to survive severe oxygen lack in the mother for short periods of time. The safety margin may be reduced by ageing of the placenta, by partial separation of the placenta, and by conditions in the placenta involving deposition of fibrin and ischaemic necrosis of villi.

Intrauterine Asphyxia

It is commonly accepted that changes in the foetal heart rate afford evidence of intrauterine asphyxia. This change in rate is similar to that seen in asphyxia in the adult where there is a preliminary acceleration followed by bradycardia. The cardiac acceleration is thought to be due to reduced vagal restraint together with increased sympathetic drive. The acceleration is later converted to positive vagal slowing, due either to a rise in arterial blood pressure acting via the carotid and aortic nerves or to a central discharge (McDowall, 1938).

A similar effect is seen in asphyxia neonatorum: when a baby takes occasional gasps with a long pause between, the pulse becomes progressively slower between gasps, but rises to the normal rate within a few seconds after a gasp which introduces oxygen into the lungs. When regular respiration is established the rate remains at 120–140 a minute. This implies that the vascular reflexes concerned in asphyxia of the adult are well developed in the foetus at the end of pregnancy, though the tachycardia mechanism may not operate. Barcroft (1946) wrote that there is a good chance of there being some vagus control before birth in man, but that it is not necessarily always present. It has been demonstrated experimentally in the goat that clamping the umbilical cord causes foetal bradycardia (Helliwell and Hutton, 1950).

Uterine Contractions and Oxygen Transfer

The weak pre-labour contractions of the uterus can lower the oxygen content of maternal placental blood (Windle and Steele, 1938). It is thought that the changes in foetal heart rate in relation to uterine contraction in labour are mainly asphyxial in origin owing to impairment of placental circulation and hence of oxygen transfer (Schultze, 1871). These changes are not invariable. In some labours there is no change in foetal heart rate during a contraction. In many there is a bradycardia during the contraction followed by a return to resting level as the contraction passes off. Waters and Harris (1931) described how the bradycardia may often be prevented by the mother's inhaling of oxygen.

Perhaps when the foetal heart rate does not vary during contractions either the reflexes are not fully developed or the placental reserve compensates for the impairment of placental circulation; or perhaps the slowing is due to pressure on the foetal head, for this often occurs when the head is subjected to pressure, such as when it is passing through the pelvic brim in a trial of labour, when the stretched cervix is sliding over it at the time of full dilatation, or when traction is applied with the obstetric forceps. The cause of the bradycardia in these circumstances is almost certainly a local asphyxia due to slowed circulation through the brain as a result of cerebral compression. Another factor which may operate was suggested by Leff (1932)—that uterine contraction squeezes blood from the placenta into the foetus, raises the pressure in the foetal circulation, and slows the heart according to Marey's law.

It is reasonable to regard foetal bradycardia during labour as being caused by local asphyxia in the medulla of the foetal brain, due either to pressure on the foetal head or to a general asphyxia of the foetus.

Placental Insufficiency

Asphyxia of the foetus may be enhanced by maternal oxygen deficiency. Under normal healthy conditions there is enough placental reserve to tide over temporary crises. When placental function is not normal it is clearly dangerous to lower the maternal arterial oxygen tension even during uterine contractions.

In a maternity department handling abnormal cases the foetal heart rate has from time to time been observed to give rise to anxiety while the mother inhales 50% nitrous oxide and air, whereas pure oxygen or 75% nitrous oxide with 25% oxygen seems to improve the foetal condition. Thus placental reserve is not always sufficient to withstand the impact of a uterine contraction and a low maternal arterial oxygen tension. A fall in the foetal heart rate of 10 beats a minute during uterine contraction is within normal limits. If the fall is greater than this, especially if the membranes are intact, then nitrous oxide and air should not be used for pain relief. Sometimes foetal bradycardia during a contraction for which the mother inhales nitrous oxide and air may not develop if she inhales nitrous oxide and oxygen. Waters and Harris described how foetal distress often follows in a labour in which there is foetal bradycardia during uterine contraction.

Thus the effect of a uterine contraction on the foetal heart rate can afford an indication of the placental reserve, though of course placental insufficiency is not the only cause of foetal distress in labour. The point is illustrated by a case described recently by Ewart Williams (1949—personal communication).

Pregnancy in a multipara with hypertension, oedema, and albuminuria was allowed to continue with some misgivings until 36 weeks, when labour began spontaneously. With the weak contractions of early labour there was a marked foetal bradycardia during the contraction and arrhythmia between contractions. Inhalation of oxygen by the mother restored the foetal heart rate to a steady rhythm, and contractions caused only slight bradycardia. The baby was delivered by caesarean section. The placenta was small, grossly infarcted, and degenerate on naked-eye examination. The placental reserve was so small that the impact of even weak uterine contractions was enough to cause obvious foetal distress.

If placental function is suspect, or if labour shows the reserve to be small, then maternal arterial-oxygen tension should be maintained and nitrous oxide and air avoided. Maternal oxygenation should also be maintained during labour lasting more than 24 hours. In a series of prolonged labours, with normal labours as controls, there was a significant increase in nucleated red corpuscles of cord blood, suggesting possible foetal oxygen lack. Again, if general anaesthesia is used for forceps delivery for foetal distress, induction of anaesthesia with pure nitrous oxide may be convenient for the anaesthetist but endanger a foetus already in distress.

Conclusion

Intermittent inhalation analgesia can play a valuable part in relief of pain in labour. Nitrous oxide and air has been used in countless thousands of labours without harm: in normal labour there is a reserve which more than compensates for any oxygen deficiency it may cause. Nitrous oxide and oxygen mixtures can, however, provide better relief of pain by virtue of the higher nitrous oxide content that can be used. At the same time they maintain the maternal arterial–oxygen tension, the importance of which has been emphasized by Greenhill (1947). Under certain conditions a fall in the maternal arterial-oxygen tension during labour is dangerous for the baby. Such conditions are when the placental reserve is suspect, as in pre-eclamptic toxaemia and premature separation of the placenta; when uterine contractions reveal a small placental reserve by their effect on the foetal heart rate; when labour is prolonged; and when labour occurs in the presence of erythroblastosis foetalis. In these circumstances intermittent inhalation of a nitrous oxide and oxygen mixture is advisable, as it is also when the mother is embarrassed by cardiac disease, pulmonary disease, or anaemia.

A mixture of 75% nitrous oxide with 25% oxygen has already been reported as giving good results (Seward, 1949a). This mixture maintains normal oxygenation while providing a high proportion of nitrous oxide for pain relief. In more than two years' use it has proved satisfactory for self-administration under the supervision of midwives trained in the use of nitrous oxide and air. Suitable apparatus should provide intermittent flow of the constant mixture at not less than 25 litres a minute; should include a reservoir bag of 6–7 litres capacity; and should incorporate a device whereby the nitrous oxide is automatically cut off when the oxygen supply fails. The apparatus designed by Warming and reported elsewhere (Seward, 1949b) has proved satisfactory in use. A refinement can be added so that the mother may inhale pure oxygen between contractions and nitrous oxide and oxygen during contractions when the foetus is distressed. Such apparatus is necessarily cumbersome because of the necessary cylinders, which restrict its convenient use to institutions.

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Medical Memoranda

Vulvovaginitis in a Child due to Shigella flexneri

It has been pointed out by various writers that organisms other than the gonococcus may give rise to vulvovaginitis in children. Haemolytic streptococci, staphylococci, and possibly Petit's bacillus have been found to be responsible for the condition (Topley and Wilson, 1946—referring to Hardy, 1941, and Osmond, 1944), and it is generally held that diagnosis of gonorrhoeal infection in children should never be made unless the gonococcus is demonstrated by cultural methods. The following case affords further evidence in support of this view.

CLINICAL HISTORY

A girl aged 7 was brought to hospital by her mother, who was worried because the child had a copious vaginal discharge for 24 hours. She was normally under the care of an African nursemaid.

Examination revealed a very heavy vaginal discharge of thick creamy pus. There was a moderate inflammatory reaction in the vulvar region. Vaginal swabs and smears were obtained, and, in view of the severity of the condition and the presence of Gram-negative diplococci in the stained direct smear, intensive treatment with penicillin was instituted. After 72 hours' treatment there seemed to be no marked improvement. Further laboratory investigations (see below) indicated a more specific line of treatment, and sulphaguanidine was given orally and sulphaguanidine powder by vaginal insufflation. The discharge ceased within 48 hours from the beginning of this therapy. Up to one month after leaving hospital there was no sign of recurrence of the discharge.

LABORATORY INVESTIGATION

The smear sent to the laboratory was stained by Gram's method and showed very numerous polymorphonuclear cells and some Gram-negative intracellular organisms, coccal in shape, occurring in small groups and arranged in pairs within these groups. As the child had an African nursemaid gonococcal infection was thought to be not unlikely, and cultural examination for the gonococcus was decided upon.

Two swabs were sent for examination, the second because of some delay which occurred between the taking and the arrival at the laboratory of the first. Both swabs were plated on blood agar and incubated at 37° C. in an atmosphere of approximately 10% carbon dioxide. The plates were examined after 24 hours' incubation. The blood agar inoculated with the first swab showed a few colonies of *Staphylococcus albus* and a few greyish, circular, low convex colonies, about 1 mm. in diameter, which were suggestive in appearance of a coliform type of organism. The blood agar inoculated with the second swab gave a heavy growth of the greyish colony in pure culture. Both plates were incubated for a further 24 hours, but no other colonies developed.

Films made of the colonies from both plates showed a Gram-negative cocco-bacillus about 1 μ in length and 0.5 μ in width. One colony from each plate was subcultured on agar slopes and, after incubation at 37° C., inoculated into tubes of lactose, glucose, mannitol, dulcitol, sucrose, and peptone water. In each case acid was formed in glucose and mannitol; there was no change in lactose, dulcitol, or sucrose; indole was not produced and the organism was non-motile.

Slide agglutination tests performed with polyvalent Flexner I and polyvalent Flexner II sera showed agglutination with the former only. Suspensions of the organism were prepared, using mercuric iodide and potassium iodide in buffered formol-saline, and tested for agglutination in tube against polyvalent Flexner I and the individual sera making up polyvalent Flexner I. *Sh. flexneri* V, W, and Z. There was agglutination to a dilution of 1 in 250 with polyvalent Flexner I and *Sh. flexneri* W; *Sh. flexneri* V showed agglutination to 1 in 25, but agglutination was not observed with *Sh. flexneri* Z.

Inquiries elicited that the girl had had diarrhoea some seven days previous to the onset of the vulvovaginitis. No one else in the family or any of the African house-servants admitted to having had diarrhoea or dysentery, so it was decided to examine specimens of faeces and rectal swabs from the child over the next 14 days. The first stool was fluid, but macroscopically no blood was seen, though microscopically red blood cells were observed together with abundant pus cells. Later specimens were more formed, and the pus cells and erythrocytes were considerably reduced in number. The swabs and faeces were inoculated on desoxycholate-citrate agar (Hynes's modification) but *Sh. flexneri* was not isolated.

In view of the findings of the direct examination, however, there was strong presumptive evidence of a bacillary dysentery infection, and the inability to isolate the organism from specimens of faeces might be accounted for by the fact that the patient was being treated with sulphaguanidine.

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Herpes Zoster Provoked by Smallpox Vaccination

In view of the correspondence on the subject of herpes zoster since the day that Bókai (1892) first noted the clinical association of the condition with varicella, the following case may be of interest.

CASE REPORT

A Chinese man aged 22, who had previously been vaccinated successfully on two occasions, was again vaccinated on November 12, 1949. This was successful, producing a small reaction in the skin over the right deltoid muscle. On November 22 he complained of pain in the right arm and the right side of the neck. A skin eruption began on the arm on the following day, and he was admitted under my care on the 25th, when he had an obvious and extensive herpes zoster from the root of the neck down the outer aspect of the right arm to the thumb. He also had widespread varicella-like discrete lesions on the trunk and face (herpes generalisatus). The dry crust of his

recent vaccination was still present, and separated normally on November 27. The course of the illness was uneventful, and he was discharged about ten days after admission.

COMMENT

This case may be an example of the activation of a latent virus disease by another virus disease. A similar sequence of events has previously been reported. The Committee on Vaccination in London (1928) suggested that vaccination may precipitate encephalitis in persons harbouring the latter virus. Levaditi and Nicolau (1926) noted that the injection of the rabies virus in rabbits produced death from latent neurovaccinia. Madonick (1946) reported a case of herpes zoster in which vaccination (in a patient twice previously vaccinated) provoked encephalitis. The herpes began on October 26, vaccination was performed on October 30, and encephalitis developed on November 7.

In Singapore herpes zoster seems to be more common and less severe than in the U.K. The above case was the most severe I have seen on the island. Vaccination of the skin served by the fifth sensory root provoked a subsequent severe herpes involving particularly the fifth and sixth roots on the same side. This case seems to be of importance as illustrating that there are dangers attached to smallpox vaccination, and possibly to autovaccination of vesicle fluid, as a therapeutic measure in cases of herpes zoster and herpes simplex.

I wish to thank Brigadier J. T. Collins, D.M.S., F.E.L.F., and Colonel C. P. Chambers, O.C., B.M.H., Singapore, for permission to publish.

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Torsion of the Gall-Bladder

Torsion of the gall-bladder is a rare condition, fewer than 80 cases having been reported in the literature. No recorded case has been diagnosed correctly pre-operatively in spite of the well-known and classical paper by Rendle Short and Paul (1934), which describes the symptomatology with great clarity and points out that a pre-operative diagnosis should be possible. The importance of making the diagnosis lies in the facts that the operation for cure is extremely simple and quick; that pre-operative treatment can be reduced to a minimum; that recovery is uneventful; while the mortality rate is directly reciprocal with the delay in operating. In the age group in which most of these cases occur—that is, 60–80—both doctor and particularly patient wish to avoid operation wherever possible, and the delay has usually arisen through giving expectant treatment on a diagnosis of acute cholecystitis.

If, however, the condition is borne in mind, the necessity for operation, together with its ease and rapidity of performance, can be plainly expressed to the patient, and the mortality rate should fall considerably from the 16% estimated by Smith (1936).

CASE REPORT

The patient, a woman aged 77, was admitted to Southmead Hospital, Bristol, on September 27, 1949. Four days previously she had had an attack of acute abdominal pain which was very severe. Retching occurred but there was no vomiting. Her bowels had not been opened for three days, but an enema gave a good result. Her temperature was 97.4° F. (36.3° C.) and a swelling which was tender was felt on the right side below the umbilicus. The next day the abdomen was less distended and an enema produced only flatus + + +. The following day there was no vomiting but the patient still complained of pain in her right side. An enema gave a good result. This state continued throughout the following 24 hours, but the swelling was becoming more tender. She was admitted to hospital four days after the onset of pain.

On admission she was seen to be a very frail old lady in severe pain. Her temperature was 98.4° F. (36.9° C.). Her tongue was dry; heart and lungs N.A.D. There was no jaundice. The abdomen was distended and tympanitic. A hard swelling which was extremely tender but quite mobile was present in the right iliac fossa. The extreme tenderness made full examination difficult. A doubtful provisional diagnosis of twisted ovarian cyst was made, but it was evident that there was some mischief in the abdomen which required laparotomy.

Operation.—Through a paramedian incision the gall-bladder presented itself wrapped in the omentum, black, distended to the size of a pear, and with a few green spots of incipient perforation. It was twisted in a clockwise direction through three complete turns around its oedematous pedicle of cystic duct and artery. Its removal was extremely simple, but the cystic artery was so arteriosclerotic that the first ligature did not occlude it. There were no stones. Convalescence was uneventful.

COMMENT

This case was misleading in that the swelling itself was so low in the abdomen: otherwise the fluctuating course of the illness, and a mobile tender lump in a frail old lady, should have enabled a correct diagnosis to be made.

Since Rendle Short and Paul's paper the balance between clockwise and anticlockwise rotation has been levelled, and to date the ratio is about 50–50. The clockwise rotation is attributed to peristalsis in the stomach (Barber, 1939), while the anticlockwise is due to colonic movements. This is a plausible theory, but does not explain why a gall-bladder lying with a free pedicle and exposed to these movements for upwards of 60 years should suddenly rotate. In my case the cystic artery which entered the pedicle above the cystic duct was a true bill "pipe-stem" artery and acted as a strut around which the pedicle must revolve, as any to-and-fro movement was impeded. The condition of the arteries has not previously been noted, but some arteriosclerotic change could be expected in the general age group, and the position of such an artery in relation to the duct might explain the direction of rotation.

The lower age limit has, however, fallen to 5 years (Cuervo, 1939), but it is easier to understand such congenital anomalies causing trouble in the first decades. In the case quoted by Berry (1939) there was a rough vehicular ride to initiate the process. In Gowland's (1946) case the attacks had been repeated over many years.

I wish to express my thanks to Dr. Phillips, medical superintendent at Southmead Hospital, for permission to publish this case.

K. P. S. CALDWELL, M.A., M.B., F.R.C.S.

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There are 86,876 dentists in the United States, one for every 1,733 persons, according to the American Dental Association.

Reviews

THE SCIENCE OF GENETICS

The Elements of Genetics. By C. D. Darlington, F.R.S., and K. Mather, F.R.S. (Pp. 446; 88 figures. 25s.) London: George Allen and Unwin. 1949.

There must be many medical men who are wondering where the science of genetics has got to and would like to have a comprehensive but relatively brief account, without, of course, popularization. This is just the book they are waiting for, provided that they are prepared to take some trouble over a subject which must remain difficult, however skilful the presentation. Some medical men are allergic to mathematics, even if they would not go so far as to say, as does one friend, that they feel quite sick if they see a square-root sign. Two of these chapters will defeat them. A much smaller number are baffled by visualizing three dimensions, finding that embryology, for example, is a very difficult subject. It is, however, only the unfortunates, if there are any such, who suffer from both disabilities who should be advised that the book is not for them.

Professor Darlington and Professor Mather have written a very concise textbook of only 374 pages, not counting glossary and index. The principles of the subject are not obscured by detail. Yet it is a very bold attempt at a complete synthesis of knowledge up to the present time. In such a book the gaps must be filled in by intelligent speculation, and this is part of their plan. It is at this point that the book may perhaps be criticized, for often it is not clearly indicated where what is generally accepted ends and the speculation begins. But this is not a serious disadvantage for those in other branches of science who want a conspectus of the subject. Apart from its excellence as a general textbook this volume should appeal especially to those whose main interests lie in the human field: there is much reference to viruses and micro-organisms and to genetics and the cancer problem, as well as a particularly interesting chapter on man himself.

J. A. FRASER ROBERTS.

GUIDE-BOOK TO BRITISH MEDICINE

The British Encyclopaedia of Medical Practice. Abdominal Emergencies to Anus Diseases. Under the general editorship of the Rt. Hon. Lord Horder, G.C.V.O., M.D., F.R.C.P. Volume 1. Second edition. (Pp. 786; 148 figures. £3.) London: Butterworth. 1950.

The second edition of the *British Encyclopaedia of Medical Practice* needs no introduction. Lord Horder has now assumed the general editorship formerly held by the late Sir Humphry Rolleston, and he contributes a brief foreword, while retaining, as an engaging act of piety, the scholarly introduction written by his predecessor for the first edition. The articles are arranged in alphabetical order, this volume beginning with "abdominal emergencies" and ending with "diseases of the anus." "Medical practice" is used in the widest sense, embracing, in this volume alone, medicine *sensu stricto*, surgery, gynaecology, obstetrics, tropical diseases, dermatology, anaesthesia, and rhinology. The articles are concise, and emphasis is laid on the practical rather than on the academic aspects. The contributors are acknowledged experts in their subjects, and it is perhaps invidious to select particular articles for mention. The excellence of Mr. Zachary Cope's account of "abdominal emergencies" was to be expected; the sections on "aneurysm" and "myocardial infarction," respectively by Dr. Maurice Campbell and Dr. Evan Bedford, are concise and lucid expositions of the subjects; and Mr. Gabriel's description of "diseases of the anus" is a contribution of great practical value.

If the aim of the editor is to provide a handbook to which the general practitioner may turn for illumination and practical guidance this first volume suggests that he has been abundantly successful in achieving it. It is not, nor indeed does it set out to be, a rival to the great systems of medicine, and in this respect its title may be misleading. As an example of book production this volume ranks high, even for one of Messrs. Butterworth's publications. It is superbly printed on fine calendered paper, and the many half-tone blocks are flawlessly reproduced. It is perhaps a little disquieting to note that the publishers found it necessary to employ a firm of printers in Vienna.

R. BODLEY SCOTT.

LECTURES ON ANATOMY

Vorlesungen über Topographische Anatomie. By Professor O. Grosser. (Pp. 354; 313 figures. 46s.) Vienna: Springer. 1950.

This volume consists of the lectures given by Professor Otto Grosser at the German University in Prague. It is a common practice in German universities for the professor to publish such a book for the benefit of the students who have attended his lectures, for it is of the utmost value to them. It is thus not exactly a textbook, for it is in such an abbreviated form as to be uninteligible to anyone not already familiar with the subject. This very brevity, however, is an advantage not only to those for whom it is intended but to those with some familiarity with human anatomy who wish to revise and extend their knowledge.

Unless this is appreciated the first chapter would fill any student with despair, for the author describes the brain and central nervous system in so compressed a form that only an advanced student could possibly understand it. Yet these are obviously the notes of very brilliant lectures from which the expert may gather hints of real value for his own work. With a very moderate knowledge of German he will have no difficulty with the language, for the expression is simple and entirely avoids the complex sentences so dear to the German mind.

There are ample illustrations, mostly reproduced from such famous classics as Toldt and Sobotta, and, although they do not attempt to emulate the superb artistic value of the originals, they are quite serviceable. One original drawing of the brain by Lepier, with the surrounding skull and overlying sutures, is of the highest quality and a real pleasure to study. Many of the diagrams will be useful to lecturers on anatomy, but in some of the illustrations, as so often happens, the artist has buried the essential points in a mass of irrelevant detail.

The book is plainly the result of a profound knowledge of human anatomy and a wide experience of teaching. It will well repay careful study by those engaged in the teaching of a difficult subject.

HENRY SOUTTAR.

TREATMENT WITH QUINIDINE

Quinidine in Disorders of the Heart. By Harry Gold, M.D. (Pp. 115. 16s.) London: Cassell and Co. 1950.

Any book that will help to overcome fear and prejudice concerning quinidine is welcome. In this country, especially, its toxic effects have been long overemphasized and its action and value improperly appreciated. This book

offers a much-needed corrective. Though the book is written primarily for general practitioners, the author's belief that students and specialists may also find it helpful is justified. The facts given and the opinions offered are based on pharmacological and clinical research, extensive reading, intimate contact with postgraduate difficulties, and practical experience over 25 years.

The many actions of quinidine are described. The side-effects are shown to be the direct result of some of these actions and, while undesirable under certain circumstances, are not necessarily toxic. Thus, quinidine lowers the blood pressure by reducing the peripheral resistance: such a side-action is undesirable when the drug is given intravenously to stop paroxysmal ventricular tachycardia in a shocked patient, and may cause immediate syncope; but a similar side-action is common to many drugs which prolong the refractory period of heart muscle and depress cardiac excitability—for example, procaine.

Although the author admits that there are patients who are allergic to quinidine and who may react to it by developing urticaria, purpura, or asthma, he has never encountered such a case himself, and does not give a test dose before beginning treatment. His observations on dosage are interesting. He wisely points out that the toxic dose of a drug is that which produces toxic symptoms, and the therapeutic dose is that which has the desired effect. It is no surprise to learn, then, that he has a number of patients who have been taking 30 to 60 gr. (2–4 g.) of quinidine daily for years.

The latter half of the book is on quinidine therapy in particular conditions. This is also helpful and informative.

As a whole, the work is an unpretentious handbook. It is written in a free narrative style, and is not illustrated. There are no references in the text, but a useful bibliography is appended. It provides just the sort of information that students and practitioners need.

PAUL WOOD.

COMMUNITY HEALTH

Personal and Community Hygiene Applied. By Jesse Feiring Williams, M.D., Sc.D., and Gloyd Gage Wetherill, M.A., M.D. (Pp. 610; 147 figures. £1.) Philadelphia and London: W. B. Saunders Company. 1950.

The preface tells us that this book is the natural development of an earlier book—*Personal Hygiene Applied.* It is a development that recognizes the significance of community problems and the social as contrasted with the individual aspects of health and hygiene.

The book is not written for the specialist. It opens with a general survey of the health problems which confront the individual. We are first given a list of 10 headings to embrace all the physical, mental, and emotional facets of health. For full positive health the individual must be adequately provided with each one of the 10 abilities which are listed—for example, ability to engage in mental and physical activity; to recover efficiently from the effects of activity; to resist fatigue in extraordinary situations; to exert strength in certain muscle groups; to act with others in harmonious groups; to experience, express, and control emotions; and so on. Thus the concept of positive health is taken to include adjustment within the social situation in which the individual finds himself.

In following chapters the authors consider more specific aspects of personal health. Thus they give simple straightforward information and advice on care of the skin, posture, fatigue and rest, food and nutrition, and so on. The pattern followed is logical: the data are presented clearly and simply. Though a paragraph heading "A Trip through the Respiratory Passage" may surprise or even shock the medical graduate, to the reasonably intelligent public it probably stimulates the imagination and offers adventure and interest.

If the first half of the book is primarily written for the lay reader, the last seven chapters, which discuss community problems, are appropriate to medical and non-medical reader alike. The study of social medicine and community health is sufficiently new to need greater publicity among the medical profession. But interest in community health, which is defined as "the quality of life in a community that is marked by the effort of people to live at their best and to help others in the community to do likewise," is clearly not the prerogative of doctors. Doctors, engineers, chemists, psychologists, and indeed every citizen—all are directly and intimately concerned. The causes and methods of prevention of disease are discussed in two of these chapters. Besides the obvious aspects with which public health authorities have for a long time been concerned, questions of occupational diseases and accidents are included here.

Some of the subjects mentioned are touched upon too briefly and insufficient evidence is provided to support the claims. Thus, for example, the paragraph on noise is far from adequate. Lighting, heating, and ventilation are all dismissed in short paragraphs. The chapter on the work of the public health authorities can do no more than give the briefest survey, but even this is sufficient to arouse the interest and satisfy some of the curiosity of the reader.

J. M. MACKINTOSH.

BOOKS RECEIVED

Review is not precluded by notice here of books recently received

A Pharmacopoeia for Chiropodists. By J. N. le Rossignol, F.Ch.S., and C. B. Holliday, M.P.S. 5th ed. (Pp. 264. 8s. 6d.) London: Faber and Faber. 1950.

A Synopsis of Anaesthesia. By J. A. Lee, M.R.C.S., L.R.C.P., M.M.S.A., D.A., F.F.A. R.C.S. 2nd ed. (Pp. 354. 15s.) Bristol: John Wright. 1950.

Recent Advances in Chemotherapy. By G. M. Findlay, C.B.E., Sc.D., M.D., F.R.C.P. Vol. 2. 3rd ed. (Pp. 597. 36s.) London: J. and A. Churchill. 1951.

A Synopsis of Surgical Anatomy. By A. L. McGregor, M.Ch., F.R.C.S. 7th ed. (Pp. 778. 25s.) Bristol: John Wright. 1950.

Hatha Yoga. By T. Bernard, M.A., Ph.D., LL.D. (Pp. 104. 15s.) London: Rider. 1950.

Acquisitions Récentes en Anesthésie et Réanimation. By Professor B. Johnson. (Pp. 74. 250 francs.) Paris: L'Expansion Scientifique Française. 1950.

Chirurgie du Cœur. By Professor F. D'Allaines and others. (Pp. 346. 1,200 francs.) Paris: L'Expansion Scientifique Française. 1950.

Handbuch der Virusforschung. Edited by Professor R. Doerr and Professor C. Hallauer. 2nd supplementary vol. (Pp. 425. 111s.) Vienna: Springer. 1950.

Cytology of the Human Vagina. By I. L. C. de Allende, M.D., and O. Orías, M.D. (Pp. 286. 55s.) London: H. K. Lewis. 1950.

L'Année Thérapeutique en Ophtalmologie. Vol. 1. Edited by G. E. Jayle and A. Dubois-Poulsen. (Pp. 414. No price.) Paris: L'Expansion Scientifique Française. 1950.

A Textbook of the Practice of Medicine. Edited by F. W. Price, F.R.S.Ed., C.M.Ed., F.R.C.P., Hon.M.D.Belf. 8th ed. (Pp. 2,076. 45s.) London: Geoffrey Cumberlege. 1950.

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A TOAST TO BACCHUS

Christmas is by some celebrated as a Saturnalia, the eating and drinking festival of the year. Wine and mead and spirits flow into unaccustomed stomachs, and beer, the national drink since 1500, softens our sorrows and spreads an air of tolerance and social warmth. Alcohol is one of the oldest drugs known to all mankind, and for hundreds of centuries has played a role in religious ceremonies and in the art of healing. Modern pharmacology has taught us how much of the teachings of tradition to accept, and what must be discarded. To-day we know that alcohol is no cerebral stimulant, but a gentle anaesthetic which lulls criticism and judgment to sleep; that the warmth of whisky in the stomach, the glow which spreads over the body and out along the limbs to frozen toes and fingers, is no new life-saving heat but a wanton spending of the body's own carefully preserved internal store, a rush of warm blood from the depths as the vessels of the skin are forced to open up. We know, too, that alcohol stimulates gastric secretion—hence the value of a glass of sherry before dinner—and provides energy for work, seven calories for every gramme.[1] Fourteen pints of beer, containing 4.5% alcohol, provide 3,500 calories, a reasonable day's energy ration without other food. Alcohol is one of the few substances absorbed directly from the stomach, and within five or ten minutes of a drink the liver is already beginning to oxidize it to acetaldehyde and acetate, which joins in the cycles of intermediary carbohydrate metabolism.

But beer, like wine, is more than alcohol. It contains vitamins. Though vitamin B_1 is notoriously absent, and many of the chronic alcoholic's symptoms are, like beriberi, traceable to this avitaminosis and not to some toxic property of the drink, beer is rich in riboflavin and nicotinic acid (0.5–1.7 μg. per ml. and 15 μg. per ml. respectively).[2] Thus a daily four pints of beer will satisfy the human requirements of riboflavin. This is of more than academic interest at a time when food supplies are short, and particularly important to peoples who may in natural circumstances enjoy but a very limited diet. Missionaries have sometimes quite properly tried to suppress the evils of drink among their native converts, only to find them falling mysteriously ill: the ban on native beer removes the native's only source of vitamin-B complex. Platt and Webb,[3] in a study of Kaffir beer, which is brewed from maize, point out that, while maize-eaters are notoriously liable to pellagra, this nicotinic-acid-deficiency disease is never seen among maize-beer drinkers because during brewing the fermenting yeast synthesizes nicotinic acid and riboflavin, so that the drink contains more than the grain from which it is made.

But for us in Britain this Christmas drink is a pleasure, not a stern necessity. We shall be less concerned with the balance of our diet than with other kinds of balance. In the great days of drinking, in the eighteenth century, a man might sit down after dinner and drink his way through four bottles of port (containing 20% alcohol by volume). He achieved this by a combination of time and practice. Food in the stomach, particularly if fatty, slows alcohol absorption; with practice the liver comes to oxidize it quicker; and with plenty of time a man may spin out his cups to keep a constant level of optimism and good fellowship.

It is said[1] that a pint of whisky or seven average bottles of beer will produce drunkenness in the average man, but few of us to-day will have the opportunity to test the first part of this statement. By the standards of our ancestors[4] we are an abstemious if not degenerate race. Gone are the days when pale ale was a breakfast drink for ladies and for boys at school, and sherry a mid-morning break. Gone too are the days of cheap gin, a sip of spirits to keep the baby quiet, and a row of infant corpses with cirrhosis of the liver. Yet a nursing mother may safely take her modest glass of stout with the best, for alcohol does not get into her milk.[1]

Talk about drink is apt to raise passions quite as fierce as those let loose by the actual consumption of liquor. The literature is immense, the debate endless. Yet medical opinion has never been against the drinking of wine and ale within reason. Hospital residents have often been served with free beer as part of their emoluments, hospital patients have often had stout prescribed as part of their diet, and textbooks sometimes indicate what wine may be allowed. It may be that the National Health Service will change this too. At least one hospital is in future to provide its residents with free journals instead of free drink, and whisky, in spite of the patient's plea, is not available on an E.C.10. "Dr. A., Please Sir would you kindly leave a prescription for me to get some Benedictine and surgical spirit. Thank you," and: "Dear Dr. B., I am writing on behalf of my sister, and as she has got a very bad cold, and also as I have heard that it is possible to have a prescription for whisky under the National Health Scheme, I hope you will give her son one. . . ." How many of us there are who get

[1] Goodman, L., and Gilman, A., *The Pharmacological Basis of Therapeutics*, 1941, Macmillan, New York
[2] Drummond, J. C., and Moran, T., *Nature, Lond.*, 1944, **153**, 99.
[3] Platt, B. S., and Webb, R. A., *Proc. Nutrit. Soc.*, 1946, **4**, 132.
[4] Drummond, J. C., and Wilbraham, Anne, *The Englishman's Food: Five Centuries of English Diet*, 1939, Cape.

appeals of this kind! The modern planned State is the direct inheritor of the Puritan tradition. Yet a little of Merrie England still lingers on in the season from Christmas to New Year, and its symbol is the glass that cheers.

FERTILITY AND INTELLIGENCE

The Royal Commission on Population was set up in 1943 and issued its report[1] in 1949. During the course of its deliberations it considered not only the total decline in the fertility of the people but also the ageing of the population which resulted from this decline, the danger of the continuance of the decline in the next decades, the different rates of decline in fertility in the different sections of the population, and also the possible effects of the continuance of this differential fertility. Since the publication of the report there has been much discussion about the effect which differential fertility might have on the quality, as distinct from the quantity, of a population and in particular upon the national "intelligence." To define intelligence in a way that would be generally accepted has always been a matter of great difficulty. Moreover, there has been, and remains, much disagreement about the value of the various methods of test used in the measurement of this attribute and also about the extent to which it is genetic in origin. Another subject of controversy has been the suggestion that the differential fertility rates which are known to exist are leading to the disproportionate reproduction of the less intelligent sections of the population. The fifth volume[2] of the *Papers of the Royal Commission* contains the data which were presented by certain authorities about the relation between intelligence and fertility. Most of this evidence has appeared in the form of papers or books since 1944 and refers to the final report of a survey carried out in 1947 by a special committee of the Scottish Council for Research in Education,[3] which found a rise in the average intelligence quotient, but some of it is additional.

The evidence which was put before the Commission was derived from a variety of investigations of both selected and unselected groups of children and was concerned with the relation between the I.Q.s of children and the sizes of the families to which they belong. Certain matters are clearly not in dispute. Fertility is different in the different social groups, and it also varies within a given social group. There is some conflict of opinion about which of these differences is the greater. The highly intelligent within the population are less fertile than the average, and those of very low intelligence are even less fertile, but here again there is a disagreement about the extent of the difference. An attribute of a general kind which can be called intelligence is inherited in part, but the relative roles of nature and nurture in its fashioning still remain matters of speculation.

The main points made by the majority of the individual authorities who presented memoranda on this subject were that the negative correlation found between the I.Q.s of children and the sizes of the families to which they belong must necessarily mean that a progressive decline in national intelligence is proceeding; that the magnitude of this decline, estimated either directly or indirectly, is of the order of 1½–3 points per generation; that the differences in the quality called "intelligence" between social classes are far less than are the differences within a particular class; and, finally, that much more evidence of the same kind as that presented to the Commission is needed—and also better methods for the testing of children—before final judgments can be made.

With these views Professor J. B. S. Haldane is not in agreement. He points out that in certain investigations it has been revealed that within a particular social class a positive correlation of parental intelligence with fertility exists. He shows that the data presented are not themselves sufficient to permit any firm conclusions to be based upon them, and suggests that it may well be that, among other influences, natural selection and mutation counteract any decline in national intelligence that might be a possible outcome of differential fertility. In his view it is imperative that an argument of this kind must be based upon knowledge of the genetic basis of this attribute "intelligence," and that before any prediction can be made it is necessary to know to what extent mating occurs between individuals of the same level of intelligence within a population and also what percentage of the extremes, above or below the average, marry and reproduce.

The possibility of a decline in the national intelligence is thus still a matter for argument. It seems unlikely that the additional knowledge that is needed can emerge from a repetition and extension of the investigations that have so far been carried out, and it is improbable that much more can be gained from the study of the I.Q.s of children alone. One complicating feature is that the rating of the child by the tests at present in use does not necessarily have any relation to what is considered intelligence in the adult: the worlds of children and of adults are different, and so are the qualities which make for success in both these worlds. The tests that are used for the measurement of intelligence may be of some value in the educational sphere; they measure an attribute in the child that is of definite importance in conventional schooling. But as yet there is no test which provides a complete assessment

[1] *Report of the Royal Commission on Population*, 1949. London: H.M.S.O. See leading article in the *British Medical Journal*, 1949, 1, 1127.
[2] *Papers of the Royal Commission on Population*, vol. 5, 1950. London: H.M.S.O.
[3] *The Trend of Scottish Intelligence*, 1949, London. See also leading article in the *British Medical Journal*, 1949, 2, 969.

of the qualities that make for success in the adult world. In fact there is no general agreement about what constitutes success of this kind. This being so, it follows that the intelligence of the future population cannot be assessed from the results obtained from intelligence tests of the children now within it. It is generally agreed that about half or three-quarters of the attribute measured by these intelligence tests is closely associated with the genetic endowment of the individual, but what is not yet known is the relative value to the adult of this portion of the individual's total intelligence, compared with the remaining half or quarter which is an acquisition and therefore subject to the influence of improving standards of living, of education, and of experience generally.

THRUSH IN INFANTS

The general belief that oral thrush is a benign disease of infants which scarcely merits attention is a dangerous illusion. Several publications in recent years have shown that serious complications are relatively common and often prove fatal. Thrush is caused by the fungus *Monilia albicans*, which is saprophytic to man except in conditions specially favourable to it. Such conditions occur in the mouth of the young infant and the vagina of the pregnant woman, for both possess acid secretions with an unusually high *p*H close to the optimal for this organism. This is the principal reason for the high incidence of oral thrush in early infancy and vaginal thrush in pregnancy, though low immunity is also a predisposing factor in the former. Ludlam and Henderson[1] and Anderson and his colleagues[2] demonstrated by repeated routine swabbing of the mouth in newborn infants that infection of the mouth with *Monilia albicans* in the neonatal period almost always causes thrush lesions within two to eight days, and they pointed out that the much higher incidence of bacteriological thrush than of recorded clinical thrush at this period of life is due to failure to recognize minor degrees of the latter. After infancy, however, infection of the mouth with this organism seldom if ever causes thrush lesions unless there is pre-existing disease, such as herpetic stomatitis. Todd[3] isolated the thrush fungus from the mouth in 14% of 1,000 healthy adults, none of whom developed thrush.

The characteristic greyish-white adherent colonies and plaques of oral thrush are most often seen on the tongue, but usually affect several parts of the buccal cavity. As a rule the lesions cover only a relatively small part of the mucosa at the height of the disease; there are no symptoms, and the infection gradually subsides. But such a benign course should never be assumed, for the disease may progress and cause fatal lesions in the alimentary tract or elsewhere. There is thus a potential danger in every case of thrush, particularly in premature and debilitated infants. It is impossible to estimate the incidence of extrabuccal thrush lesions, but in post-mortem examinations of infants they have been shown to be quite common. In severe cases of oral thrush the infection is more likely to spread down the alimentary tract than in mild cases and to reach either the pharynx or oesophagus or both. Several series of thrush oesophagitis discovered at necropsy have been reported. In this country Ebbs[4] found the infection in 22 infants under 1 year, and Ludlam and Henderson in 20 newborn infants, while Lederer and Todd[5] discovered 21 cases in a series of 204 post-mortem examinations on infants up to 12 months old. Invasion of the stomach and intestines is very uncommon. Ludlam and Henderson observed gastric lesions in four of their cases of oesophagitis in the newborn; Lederer and Todd reported lesions of the ileum in three infants with thrush oesophagitis and in one with pharyngitis. Lesions in the colon were found in two of Ebbs's cases. Macgregor and Henderson[6] described thrush ileitis in two premature infants, one of whom had oesophagitis and the other no detectable thrush lesions elsewhere. The diagnosis of extrabuccal thrush lesions is a matter of conjecture, and can generally be made with certainty only at necropsy; but the presence of oral thrush, which may require careful search, or the demonstration of *Monilia albicans* in films or cultures made from oral swabs or from the stools, should at least suggest the possibility of this infection in ailing infants in whom no other cause of illness can be found.

Severe thrush causes ulceration of the underlying mucosa, with consequent secondary infection by pyogenic organisms. In oesophageal infections a pseudomembrane may be formed. The lesions then become acutely inflamed, and painful if in the mouth, pharynx, or oesophagus. The infant looks ill, loses appetite, and may have difficulty in swallowing if the pharynx and oesophagus are affected. Regurgitation is another common feature of oesophagitis, and vomiting—sometimes associated with haematemesis—dehydration, and loss of weight may also occur. In such severe infections vomited matter may be aspirated by the weakly infant, with fatal results, either from sudden suffocation by occlusion of the main air passages or more often from aspiration bronchopneumonia. The thrush fungus can usually be found in inhaled foreign matter and inflammatory exudate, but seldom invades the bronchopulmonary tissues. Infection of the middle ear is an occasional complication: Lederer and Todd found the

[1] *Lancet*, 1942, **1**, 64.
[2] *Amer. J. Dis. Child.*, 1944, **67**, 450.
[3] *Amer. J. Hyg.*, 1937, **25**, 212.
[4] *Arch. Dis Childh.*, 1938, **13**, 211.
[5] Ibid., 1949, **24**, 200.
[6] Ibid., 1943, **18**, 186.

mastoid infected in 5 of 21 infants with oesophagitis. In large thrush lesions there is deep penetration of the mycelial strands with invasion of lymphatics and venules and, rarely, of surrounding structures. Organisms thus gaining access to the blood stream usually perish, but occasionally set up metastatic lesions in distant parts of the body. Several cases of *Monilia albicans* meningitis have been described, and Lederer and Todd reported two instances of metastatic thrush lesions in the kidneys. The same authors also found the hitherto unreported complication of empyema in two infants with thrush oesophagitis, and they showed that there had been a direct spread from the oesophagus by penetration of the mycelium through the oesophageal wall and parietal pleura. Septicaemia and pyaemia caused by secondary pyogenic invaders of thrush lesions, usually *Staphylococcus aureus*, are probably more common than metastatic lesions: Lederer and Todd observed this complication in five cases, one of which also had renal metastatic lesions.

The incidence of thrush is much higher in nurseries, where opportunities for cross-infection usually abound, than in the home. It is also much higher in bottle-fed than in breast-fed infants, because feeding utensils may be contaminated. Ludlam and Henderson found that in a maternity hospital infants with oral thrush excrete viable organisms in the stools and usually have infected hands. They also isolated the organism from pooled breast milk used for feeding premature infants, and from the fingers of nurses engaged in feeding infants. Aerial dissemination of the spores rarely occurs. The slightly higher incidence of oral thrush in the infants of mothers with vaginal thrush may be due to direct inoculation of the mouth at birth, but is more likely to be caused later by indirect infection from the hands of the mother. There is no doubt that cross-infection resulting from faulty nursing technique is the principal reason for the high incidence of thrush in nurseries. Where the danger of cross-infection exists the infants' mouths should be carefully inspected daily, and those who show the earliest sign of thrush, as of any other infection, should be isolated immediately. The application of gentian violet, 1% in aqueous solution twice daily, in the early stage of oral thrush usually checks the spread of the lesions and causes their disappearance within a week.

BACTERIOLOGICAL GRADING OF ICE-CREAM

The Regulations[1] introduced for the processing and heat-treatment of ice-cream "mixes" (and the increasingly effective methods of detection and supervision of excreters of enteric bacilli) have helped to make ice-cream safer. Because no laboratory test can guarantee the absence of pathogens there is a need for a reliable test of general bacterial cleanliness. This has been for some years the concern of a subcommittee of the Public Health Laboratory Service, which has recently issued the last of four reports.[2-5] The evidence submitted by the committee indicates that ice-cream can be examined for bacterial contamination in a simple and practical way by the methylene-blue test, the principles of which are the same as in the test applied to milk. The technique of the test was described in 1949.[3] In order to show latent contamination the reductase tube containing the sample and the dye must be pre-incubated in a water-bath at 20° C. for 17 hours. Provisional gradings are as follows: grade 1 fails to reduce methylene blue in 4 hours; grade 2 reduces in 2½–4 hours; grade 3 in ½–2 hours; and grade 4 in 0 hours—i.e., is decolorized on removal from the 20° C. water-bath.

Some early reports on this test seemed to indicate that it was too severe and did not reflect the degree of cleanliness or contamination. These complaints have been investigated and answered by the committee, the members of which were unable to detect the existence in ice-cream of any non-bacterial substance capable of reducing methylene blue. A complaint was also examined that the presence of aerobic spore-bearing bacteria of no hygienic significance was responsible for the failure of certain makers with good equipment to attain grade 1. It was found that these thermoduric bacteria were in fact responsible, in a small percentage of cases only, for grade 2 results when grade 1 might have been expected. But, as the committee points out, organisms of this type are a potential cause of food-poisoning, and their presence usually indicates imperfect cleansing and sterilization of plant. The committee also discussed the claims of other tests favoured by certain workers. The sampling and experimental errors of the plate count are numerous, and it has special disadvantages as a test for ice-cream, which is difficult to measure accurately because of its physical characters and contains bacterial aggregates unevenly disintegrated by the various methods used for homogenization. It is more costly and time-consuming than the methylene-blue test. The coliform test, which is also subject to large sampling errors, takes count of one group of bacteria only, and the presence of *Bact. coli* Type I (so classified on the basis of the 44° C. MacConkey broth test) does not have the same significance as in water examination, since these organisms in ice-cream classified as grades 1 and 2 were found mostly to be irregular types, presumably not of faecal origin. The methylene-blue test has been criticized because its results could not be related with those of the plate-count and coliform tests, but in view of the variable results given by the latter any close correlation would be surprising.

The conclusion is that the methylene-blue test is a satisfactory method for the bacteriological grading of ice-cream. Samples must be carefully collected, and the hygienic quality of ice-cream from any one producer must be judged on a series and not on a single sample. It is gratifying to learn that a steady increase in cleanliness has been observed during the last three years, for all who are concerned about methods of food handling in general know how much progress has yet to be made. A final point of

[1] Ice Cream (Heat Treatment, etc.) Regulations, 1947. See annotation in the *British Medical Journal*, 1946, **2**, 584.
[2] *Mon. Bull. Min. Hlth*, 1947, **6**, 60.
[3] Ibid., 1948, **7**, 84.
[4] Ibid., 1949, **8**, 155.
[5] Ibid., 1950, **9**, 231.

practical importance is that the efforts of the producer may be vitiated by the practice common among retailers of keeping the serving-spoon in a jar of water which in warm weather rapidly becomes heavily contaminated with bacteria.

ASPIRIN AND CORTISONE

We mentioned in last week's *Journal* that the Ministry of Health is to distribute small quantities of cortisone and A.C.T.H. to selected hospitals, but this, of course, will not mean any slowing down of the search for substitutes for these substances which might have similar effects in rheumatoid arthritis and other diseases. The great interest shown recently in the use of deoxycortone acetate and ascorbic acid exemplifies this tendency, though, as it turned out, this treatment was ineffective.[1 2] The paper by Drs. J. B. Cochran, R. D. Watson, and J. Reid in this issue suggests a new approach to the problem by pointing out certain similarities between the action of aspirin and of cortisone in acute rheumatic fever. They observed acne, rounding of the face, and a reduction of glucose tolerance in a patient under treatment with aspirin for acute rheumatism, and they suggest that the development of a mild Cushing's syndrome during intensive salicylate treatment is not uncommon. The general similarities between the effects of salicylates and cortisone in the treatment of acute rheumatism are obvious. Both substances bring about a rapid relief from pain, an improvement in the arthritis, a fall in pulse rate and temperature, and a reduction of the erythrocyte sedimentation rate. Both prevent relapse so long as administration is continued. Neither can be said to be curative, though both seem to hold the disease at bay and to give the patient an opportunity to make his own recovery. Indeed, the introduction of salicylate therapy for acute rheumatism in 1875 must have raised many of the questions that have been asked more recently about the advantages and disadvantages of cortisone. The Glasgow workers support their contention that the two substances may have a common action in acute rheumatism by comparing the metabolic effects of salicylate therapy, which were recently reported in detail by Reid, Watson, and Sproull,[3] with those of cortisone. They refer in particular to the changes in sodium, potassium, water, and protein metabolism, though in so far as the last is concerned it is not clear whether the negative nitrogen balance noted by them in acute rheumatism is due to salicylate therapy or whether it may be present in any acute febrile illness. On the other hand, there are arguments against the possible common action of aspirin and cortisone. Among the diseases in which cortisone is of benefit, acute rheumatism alone responds in dramatic fashion to aspirin. It seems possible, though not yet certain, that cortisone may prevent the occurrence of heart lesions in acute rheumatism, while it is doubtful whether salicylates have any such effect. Cochran and his colleagues emphasize that the two substances cause alkalosis by different means, though they consider that this may be explained by differences in the doses commonly used. Possibly the occurrence of features suggesting Cushing's syndrome may be an expression not of aspirin therapy but of a large endogenous production of cortisone and other steroids as a part of the patient's reaction to his disease. As the authors recognize, there are many points requiring investigation before any final conclusions may be reached about their most interesting suggestion. It will be important to compare the metabolic effects of salicylates with those of cortisone in non-rheumatic subjects, and it would be interesting to know more about the metabolic features of acute rheumatism uninfluenced by salicylate therapy, though it is hardly justifiable to withhold such treatment.

[1] Copeman, W. S. C., *et al.*, *British Medical Journal*, 1950, 1, 1007.
[2] Quin, C. E., Mason, R. M., and Knowelden, J., ibid., 1950, 2, 810.
[3] *Quart. J. Med.*, 1950, 19, 1.

ELECTRON MICROSCOPY

As with other new instruments, the successful use of the electron microscope demands knowledge of a practical kind. This is usually the last to be systematized, being inadequately covered both in conventional textbooks and in original publications, which for the most part are concerned with results. However, as instruments multiply, it becomes increasingly desirable that such information should be placed on record and that experience won the hard way should be shared with others. There are also points on which it is well that a wider audience should be informed. Electron microscopy is a technique of research from which the best value is often obtained in conjunction with other methods, as was well demonstrated by Cooper, Rowley, and Dawson[1] when they used it in conjunction with the radioactive tracer method to provide a virtually conclusive proof that the action of penicillin is within the bacterium and not on the cell wall. Such uses can become common only when there is a fairly wide knowledge of both the strength and the limitations of the method: for the contribution it can make will not otherwise be apparent to those with problems to present. There are also other matters—such as the degree of reliance to be placed on magnification figures, and the extent of distortion which is possible within a single picture—on which others concerned with interpretation may be in need of guidance.

For all these reasons the Royal Microscopical Society and the Electron Microscopy Group of the Institute of Physics have earned gratitude by their co-operation in producing a practical treatise which contains references up to 1949 and, through successive processes of editing, has been adequately systematized. Its origin was a meeting of British electron microscopists which was held at Hampstead in 1945. Draft articles were supplied by some 10 authors and edited by Dr. D. G. Drummond into a composite treatise, published in a typescript edition by the Institute in 1948. Further notes were written for a summer school in electron microscopy which was held at Cambridge in the same year, and additional material has been collected from original publications and conferences. The end-result is a treatise—in effect a complete issue of the Society's journal[2]—in which individual contributions, though acknowledged, are no longer recognizable. To obtain full benefit it should be studied as a whole, and it may be hoped that many concerned with the use of electron microscopy may be induced to do so. Chapters on basic techniques and on the calibration of magnification and resolving power are common to all uses. From the latter it may be learnt that the repeat patterns on certain

[1] *Nature, Lond.*, 1949, 164, 842.
[2] *J. R. micr. Soc.*, 1950, 70, Pt. 1, 1–141.

diatoms have proved of value as working standards and that, with further improvements in instruments, the particles of a plant virus may prove still more satisfactory. A serious point to be noted is that the assignment of magnification figures is a matter of difficulty, and that uncertainties of the order of 10% are to be expected. Chapters of specifically medical interest deal with airborne particles, micro-organisms, and biological tissues.

ANAESTHESIA IN THE NEWBORN

With increasing refinements in the surgical treatment of congenital abnormalities more newborn infants are likely to be operated on than a few years ago. To keep pace with surgical advance anaesthetists must readjust their approach to the anaesthesia of these very small patients. Local analgesia is still the choice of many surgeons, but if general anaesthesia can be used with safety to the child and at the same time provide a quieter field for the surgeon it is likely to replace regional infiltration, as it has done in other difficult operations. What the anaesthetist has to try to develop is a technique which overcomes the resistance in the infant's air passages, avoids excessive rebreathing, and maintains light anaesthesia. Respiration in the neonatal period is normally accomplished by the diaphragm and abdominal muscles, with very little thoracic movement. An effect of the infant's relatively large body surface is seen in the comparatively large respiratory minute volume at this time. In the newborn it is 838 ml., compared with 7,100 in the adult. Measured per kilo of body weight, it is 239.5 ml. and 101.5 ml. respectively. The larger value in the infant appears to be the result of rapidity rather than of depth in breathing, since its tidal air volume is about 19 ml. and the vital capacity 170 ml. Anatomically, the infant's tracheobronchial tree is adapted to counteract the comparatively small area available for respiratory exchange, and, as Dr. G. Jackson Rees mentions in his paper published on another page, the area of the cross-section of the trachea in the newborn is twice that at twelve months in proportion to the lung volume. Snyder's work on rabbit foetuses of varying maturity has shown the great sensitivity of the respiratory centre to the lack of carbon dioxide. His experiments indicate that a certain level of carbon dioxide is essential for the maintenance of foetal respiration. However, it still remains to be shown whether or not the chemical regulation of the breathing before birth is the same as that following delivery. Therefore the newborn infant cannot be relied on to react to varying concentrations of carbon dioxide in the same way as the foetus, even if the latter is post-mature.

The moderately asphyxiated newborn infant registers a definite objection to the insertion of an endotracheal tube, but, as Rees states, the infant is unable to exhibit the reflex contractions of the cervical muscles which are seen in the adult. The observable reactions of the infant are an active pharyngeal reflex and a facial appearance of being on the point of crying. But under light anaesthesia the facial sign is absent, and the only sign then present on insertion of an endotracheal tube is a disturbance of respiratory rhythm. *X*-ray photographs of the newborn, taken at intervals from birth to about twenty-four hours after delivery, show increasing quantities of air in the gastro-intestinal tract. The entrance of air inevitably causes crowding of the abdominal cavity. This and the diaphragmatic breathing peculiar to the newborn tend to cause turbulence in the operative field—an added difficulty for the surgeon. Fortunately, natural conditions can be used to ease the anaesthetist's task. Because of the relative absence of muscle tone in infants their lungs can be artificially ventilated with very low pressures, a process impossible in the average adult; and the rapidity with which acapnia occurs allows easy control of respiration.

TREATMENT WITH HEPARIN

The increasing use of anticoagulants brings to the fore the need for an agent that is safe, effective, easy to control, and convenient to administer. No such agent yet exists. Owing to the difficulty in controlling dicoumarol and similar substances, and the grave risks attached to overdosage, attempts have been made to find a more convenient way of administering heparin, which is certainly the safest and most effective anticoagulant. It is, however, still expensive. Up to the present time heparin has usually been given in hospital by intravenous injection; Gunnar Bauer[1] has recently described the results obtained over a nine-year period at the Mariestad Hospital, Sweden. In an article in this issue Dr. D. G. Abrahams describes the effects of intramuscular heparin. He obtained satisfactory prolongation of the clotting time by giving 25,000 units twice a day. Such dosage may be kept up for two or three weeks or even longer. If heparin is to be used in this way in general practice it is necessary that the complications should be fully recognized. Wood[2] has discussed these in his description of heparin therapy. Abrahams says that local pain may be satisfactorily overcome by the simultaneous injection of 1–2 ml. of 1% procaine. It is only fair to point out, however, that, although this prevents immediate pain, marked discomfort may arise an hour or two later. Again, local bleeding is common rather than "very occasional," and may be extensive. Patients should certainly be warned that bruising may occur, and that it need cause no alarm. Over the past few years quite a large number of patients have been treated with intramuscular heparin in their homes, on the whole successfully, and, so far as is known, safely. A satisfactory dose is 15,000–20,000 units intramuscularly with 1–2 ml. of 1–2% procaine; this may be given twice daily to an adult without danger. Clotting times can be estimated occasionally to make sure the dose is adequate, but are unnecessary as a precaution against overdosage (unless larger doses are used). The chief indications for heparin therapy include thrombophlebitis, phlebothrombosis, acute peripheral arterial occlusion, and severe or complicated cardiac infarction. Treatment should be continued for two to three weeks. As a rule general practitioners should seek expert advice before embarking on a course of heparin injections.

We announce with great regret the sudden death of Sir Leonard Parsons, F.R.S., in Birmingham on December 17. He was 71 years old.

[1] *Angiology*, 1950, 1, 161.
[2] *Diseases of the Heart and Circulation*, 1950, London.

REFRESHER COURSE FOR GENERAL PRACTITIONERS

THE TREATMENT OF LUMBAR DISK LESIONS

BY

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Much confusion exists on this subject. Some years ago the main difficulty was to appear credible when attributing such well-known conditions as lumbago, fibrositis, and sciatica to so recent a discovery as a disk lesion. Now that the diagnosis has become widely accepted, medical men have found themselves in a therapeutic quandary. Traditional measures such as drugs (apart from analgesics), radiant heat, diathermy, massage, exercises, injecting nodules, and "taking the waters" have suddenly lost their last vestige of theoretical justification. Little has so far come forward to replace these abandoned types of "treatment"; and the distress of doctors and patients at the apparent absence of effective conservative measures is heightened when they find out that the only radical treatment is an operation—by no means always successful—warranted only in extreme cases.

This therapeutic nihilism is quite unjustified, for there are a number of simple treatments, none a panacea, each with its due proportion of successes. Few patients prove unrelievable if conservative means are intelligently employed, and it is only for some of these few that surgery need be contemplated at all.

Prophylaxis

Realization that disk protrusion is very common and that maintenance of the lumbar lordosis provides the main safeguard against this phenomenon is proceeding slowly. Aesthetic considerations have held the foreground for a century, and it is difficult now to get gymnasts to realize that a reasonable degree of lordosis in children is a great advantage in later life (see Fig. 1). School medical officers can see to it that exercises towards trunk flexion (see Fig. 2) are carried out sparingly, and that, unless marked kyphosis is present, no effort is made to flatten school-children's lumbar spines. If any individual cannot reach forwards far enough to touch his toes he must not be encouraged to practise this useless range of movement. Adult women's backache often dates from lying in bed in "the nursing mother's position"—that is, many pillows propping the thorax and no proper support at the lumbar spine, which droops into kyphosis all day. No wonder the posterior longitudinal ligament finally stretches and the beginnings of disk protrusion are laid down. All patients, including puerperal women, should lie flat when they have no reason to be sitting up, and as soon as their condition permits they should turn and lie prone for several periods each day.

FIG. 1.—Joint space in extension. Tracing of *x*-ray photograph of the fourth lumbar intervertebral joint in a normal subject, bending backwards. Note that the front of the joint space is ¼ in. (1.25 cm.) wide, but the back only 3/16 in. (0.5 cm.). In this position backward movement of the intervertebral disk is virtually impossible.

Industrial medical officers can help by arranging that weights are presented to workers at a proper level and by showing them how to lift safely. Since an attack of disk protrusion is clearly an industrial accident, they can also save their firms much money in this way. Builders can put in sinks at a higher level than has hitherto been customary, and so on. The makers of car seats are among the worst offenders; these are so shaped that it is all but impossible to maintain a lordosis while sitting in a front seat.

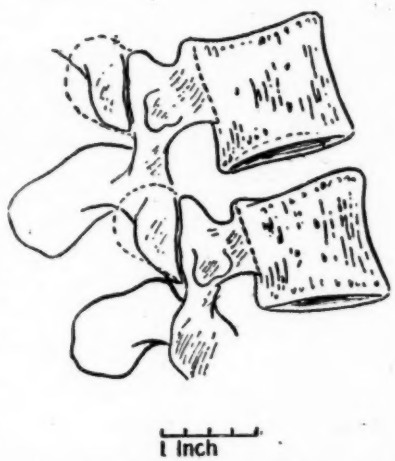


FIG. 2.—Joint space in flexion. The same subject as in Fig. 1, bending forwards. The joint space is now 5/16 in. (0.8 cm.) wide in front, and ¼ in. (0.6 cm.) behind.

Manipulation

Naturally if something is out of place the most obvious treatment is to restore it to its proper position and then maintain it there. Therefore, unless some good reason exists, manipulative reduction should be attempted at once. This measure is universally adopted when a torn meniscus in the knee-joint has moved, but it has been left largely to osteopaths to reduce cartilaginous subluxations at the spinal joints. Without realizing it, they have been doing so for years, to the recurrent discomfiture of doctors. When one considers how unskilled many lay manipulators are and how faulty are their views on the nature of the disorder under treatment; when, too, one remembers for how many years patients with severe disk lesions have been manipulated—often without benefit, it is true, but also without hurt—even under anaesthesia by medical men, it is evident that the present change of front towards emphasizing the dangers of manipulating the lumbar spine represents too great a swing of the pendulum.

The first decision that has to be made is whether the displacement is reducible or irreducible by manipulation. The reason for the two different responses to manipulation is anatomical. Protrusions may consist primarily of a fragment of annulus fibrosus or of nuclear material with an intact annulus. R. H. Young, in an analysis of cases coming to laminectomy, showed that in 56% of his cases the protrusion was cartilaginous, and in 44% pulpy. My impression is that in patients not requiring operation the

proportion is more like two cartilaginous protrusions to one pulpy. Manipulation can, of course, reduce a cartilaginous displacement but cannot affect a pulpy protrusion; this, by contrast, can nearly always be made to ooze back into position by gradual means. Thus the first major decision—whether or not manipulation should be attempted—rests on an evaluation of the symptoms and signs differentiating a nuclear from an annular protrusion. These are set out below.

Differentiation of Cartilaginous from Pulpy Protrusions

The history is often indicative. For example, a patient bends forwards and feels some aching in his back, which gets worse later in the day. Next morning he finds himself unable to get out of bed because of severe lumbago. This history indicates a protrusion that has gradually

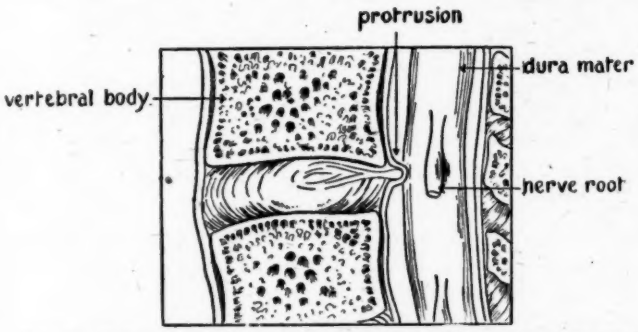


FIG. 3.—Pulpy protrusion causing lumbago. The nucleus has protruded backwards, the annulus remaining intact (after R. H. Young). Manipulation is unlikely to succeed; sustained traction or recumbency is effective.

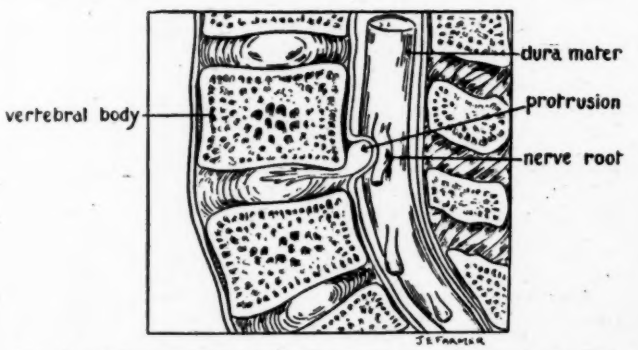


FIG. 4.—Pulpy protrusion causing sciatica. The protrusion has increased in size and has passed postero-laterally. As a result the pressure on the dura mater is released but the nerve root is severely squeezed (after R. H. Young).

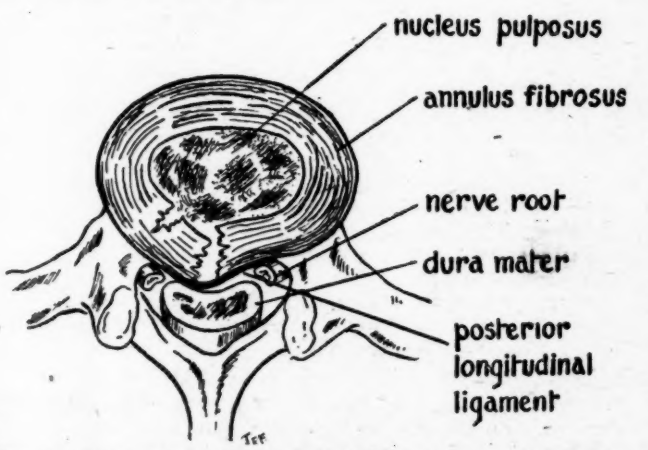


FIG. 5.—Cartilaginous protrusion causing lumbago. The annulus is cracked and hinged. Reduction by manipulation should be simple.

increased in size—that is, one consisting of nuclear material (see Figs. 3 and 4). By contrast, the patient who is subject to attacks initiated by a click in the back followed by agonizing lumbar pain fixing him in flexion has clearly suffered an abrupt cartilaginous displacement (see Fig. 5). Pulpy protrusions are rare in the elderly; hence any protrusion in a patient aged 60 and over, especially if lumbar osteo-arthritis is present, is almost certainly reducible by manipulation, whether causing lumbar, gluteal, or sciatic symptoms.

Primary postero-lateral protrusions causing sciatica are nearly always irreducible by manipulation. This is indicated when a patient with a low lumbar disk lesion states that his pain began in the calf or thigh without previous backache. Naturally a central displacement impinges first against the dura mater, thus causing backache before it sets up sciatica; primary postero-lateral protrusions never touch the dura at all, hence premonitory backache is absent.

Another type of history characterizes the self-reducing disk lesion; in such a case manipulative reduction may well succeed there and then, but brings only a few hours' relief. The patient wakes comfortable, and as the day goes on backache appears and becomes slowly more severe, especially if he stoops or lifts. A night's rest once more abolishes the pain. Naturally, if the posterior bulge at the joint recedes spontaneously as soon as the stress on the joint ends, only to recur when the joint is made to bear weight again, the reduction brought about by manipulation is equally unstable and ephemeral. Manipulation carried out at a time when no displacement is present is, of course, quite pointless.

A similar history characterizes what I have named the "mushroom phenomenon." In an elderly patient, backache accompanied by bilateral sciatica comes on after about 10 minutes' walking or standing and is abolished as soon as he rests. It is often mistaken for intermittent claudication. *X*-ray examination shows that the joint space

FIG. 6.—Anterior disk protrusion. All the disk substance has passed forwards and lies enclosed between two large osteophytes. The intervertebral space has disappeared.

at, usually, the fifth lumbar level has disappeared, the disk substance being displaced forwards and lying as a round ball between two large osteophytes (see Fig. 6). Anterior protrusion proceeds silently, causing no symptoms until the disk has been ground to pieces and the compression of weight-bearing causes capsular bulging all the way round the joint. The posterior component then irritates both the dura mater and the nerve roots. This lesion is difficult to treat and seldom responds to manipulation.

Referred rectal, penile, or coccygeal pain, paraesthesiae felt in the scrotum, or a complaint of difficulty in micturition may indicate a protrusion imperilling the lower sacral roots. Since the important danger of manipulation in an unsuitable case is lasting urinary incontinence, I regard this type of referred pain as contraindicating manipulation. Not having attempted it in such a case, I naturally cannot be sure to what extent this apparent danger is real.

Of the physical signs, the appearance of the patient's back is the most informative. Lateral deformity of the lumbar spine when he is viewed standing still, or apparent when he bends forwards, indicates a protrusion that has gradually increased in size until it visibly interferes with joint movement. A cartilaginous displacement does not get larger; a pulpy protrusion can; hence considerable lateral deviation indicates irreducibility. I have also found that reduction by manipulation is difficult, at times impossible, in patients whose most painful movement is side flexion *towards* the painful side.

Marked neurological signs should be taken as an indication of irreducibility, whether the lesion was originally of cartilage or pulp. Displacement of a fragment of annulus may later be followed by extrusion of nuclear material along the line of the fracture. This leads to severe compression of the nerve root and proportionate interference with conduction. Thus, weakness of more than one muscle in the leg, combined with, say, loss of ankle-jerk, cutaneous analgesia, or much gluteal wasting, shows that this secondary effect has supervened.

A disk lesion at the unstable joint resulting from spondylolisthesis is treated in the same way as an ordinary disk lesion.

Technique of Manipulation

Manipulation, then, is carried out unless a contraindication exists. Anaesthesia must be avoided; for the patient stands up after each repetition so that he can judge the effect on his pain and the manipulator can assess any change in the range of movement. The patient lies prone on a firm couch 15 inches (38 cm.) high and various manual pressures are applied at the appropriate lumbar level. If these fail, rotation strains should be tried. If manipulative reduction is attempted in this careful way aggravation can be certainly avoided. However, this treatment may require two or three repetitions and an adequate session may last half an hour, hence it is my practice to delegate almost all this work to physiotherapists trained—as all our students are—in these methods. Few doctors have time, inclination, or a suitable couch for carrying out such manœuvres themselves; moreover, these have in practice been found suited to delegation.

Other Treatments

When manipulative reduction is contraindicated or fails, less satisfactory methods have to be tried.

Sustained Traction

Sustained traction is the method of choice for ambulant patients with pulpy herniations whose symptoms warrant treatment. Distraction at the affected joint has two effects. (1) Increase in the interval between the vertebral bodies, thus enlarging the space into which the protrusion must recede. (2) Tautening of the joint capsule. Naturally, when the slack is taken up, the ligaments joining the vertebral bodies exert centripetal force all round the joint; this tends to squeeze the pulp back into place. Thus, sustained traction merely represents a way of achieving in a very short time the same effect as rest in bed for some weeks.

Bands encircle the patient's mid-thorax and pelvis as he lies on the traction couch (see Fig. 7); they are attached to

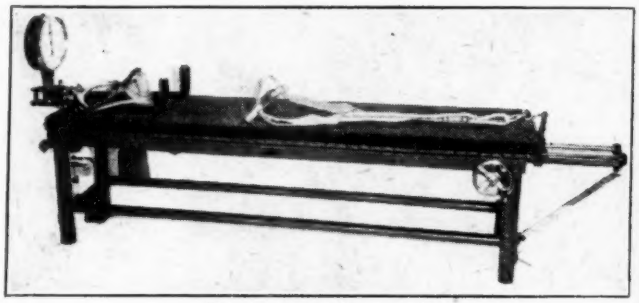


FIG. 7.—Traction couch.

hooks at the head and foot of the couch. The greatest possible traction that he will permit is then applied for as long as is reasonable. In practice, 200–300 lb. (91–136 kg.) is applied for two or three periods of 20 minutes each with, say, five minutes' rest between whiles. The longer the patient can stand the traction, the more effective it becomes. This treatment is carried out daily until he is well; and this takes one to two weeks.

Sustained traction is useless for the reduction of cartilaginous displacements; these have to be clicked back. Manipulation during traction, however, is sometimes called for in difficult cases, but is not often much of an improvement on manipulation alone.

Recurrence after laminectomy is distressingly common and in my experience hardly ever relievable by manipulation. By contrast, sustained traction may be successful.

Epidural Local Analgesia

The injection for epidural analgesia is regarded as difficult and dangerous by some authorities. So far I have used this method on out-patients more than 10,000 times without ill effect and have found it impossible to introduce the needle properly in less than 1% of all cases. There are three main indications:

1. In acute lumbago the cause of the pain is a central posterior protrusion impinging on the dura mater. If this membrane is anaesthetized by 50 ml. of 0.5% procaine, introduced extrathecally via the sacral canal, the protrusion presses on a membrane no longer sensitive and all pain ceases for the duration of the analgesia—that is, one to two hours. During this time a patient can move freely, perform some essential work, or go home to bed. He can be manipulated during local analgesia. Often, as a result of the free active joint movement obtained, he succeeds in himself initiating reduction; hence the infiltration is often followed by a large measure of lasting relief.

2. Persistent lumbar or sciatic aching *after* reduction of a prolapsed disk may prove troublesome; it is apparently due to persistent local bruising of the dura mater. One or two epidural injections usually suffice to stop it.

3. Chronic backache, especially if it is more severe at night than by day, associated with only slight articular signs at the lumbar spine can often be lastingly abolished by one induction of epidural local analgesia.

Recumbency

This is the traditional treatment for both lumbago and sciatica; though tedious and time-consuming, it is regularly effective in the end. It brings about reduction by abolishing the compression factor at the affected joint. The more severe the symptoms—*not* the signs—the more is recumbency both called for and welcomed. In sciatica the pain may not begin to abate for the first two days and the patient may insist on getting out of bed to walk about the room. Though this may bring slight temporary relief, it postpones the initiation of reduction. Hence the patient should receive enough analgesics, usually morphine, to keep him quietly resting for the first day or two. As soon as he can, he must lie supine with a small pillow under his lumbar area and only one under his head. This maintains his lordosis—that is, keeps the front of the joint as open as possible. In this position the articular contents tend to move anteriorly, away from the dura mater or nerve root. Patients with sciatica should be kept in bed until straight-leg raising is painless at full range. No one should be kept in bed until all the neurological signs recede, for these may take months to disappear; indeed, an absent ankle-jerk may never return.

Patients in severe pain, with marked weakness of the muscles controlling the foot coming on in, say, less than a week from the onset of sciatica, should be put to bed at once. The mild discogenic backache that so many people experience is usually unaffected by recumbency; sometimes it makes it worse.

Spontaneous Cure

Backache shows little tendency to spontaneous cure; it may last, or recur, during a patient's whole lifetime. Sciatica, however, nearly always gets well of itself in about 12 months. The two exceptions are: (*a*) after laminectomy this does not happen, and sciatica may then persist for years; and (*b*) after the age of 60 spontaneous cure with the lapse of time is improbable.

Young patients with sciatica are sometimes seen showing clear evidence of a pulpy herniation, at a low lumbar level, of some months' standing. The pain often amounts to only an ache; the patient has a cheerful demeanour and sleeps well. Examination shows a symmetrical lumbar spine when he stands upright, lateral deviation on attempted flexion, 45 degrees limitation of straight-leg raising on one side only, and slight neurological signs. Treatment is not called for, except epidural local analgesia, which sometimes lastingly diminishes the pain, and the patient can safely be advised merely to await spontaneous cure. This takes place by erosion of bone at the posterior aspect of the vertebral body, the displacement becoming accommodated in a situation where it no longer presses on anything sensitive and from which redisplacement is impossible. Hence patients who get well by awaiting erosion appear thereafter no more liable to sciatica than normal people. This is an important point, for the only alternative treatment in these cases is laminectomy, which, however successful it may be, cannot afford the patient comparable security from recurrence.

The tendency to lumbago often ceases spontaneously between the ages of 50 and 60. As age advances, the spinal joints stiffen and osteophytes, both cupping the disk and limiting articular movement, make their welcome appearance.

Laminectomy

This is to be avoided as far as possible, but operation should not be unreasonably withheld. In the best hands the results are far from perfect; immediate cure is not always secured and eventual recurrence is regrettably frequent, even in patients who never go back to heavy work. The three main indications are:

Gross Lumbar Deformity.—A young patient should not be left to recover spontaneously from sciatica or—less often—backache causing marked persistent lumbar deformity. Though he may recover as regards pain, the deformity remains permanent.

Incipient Drop-foot.—A patient who develops increasingly pronounced weakness of the dorsiflexor muscles of the foot must be warned, so that he may choose between laminectomy and a permanent weak foot. In such cases pressure atrophy may cause complete insensitivity of the nerve root; as a result, pain is abolished and straight-leg raising quickly reaches full range; at the same time the palsy becomes complete. The patient, concerned as he has been with his pain, is apt mistakenly to believe himself to be improving; unless his foot is examined, the doctor may be led to share in this error.

Intractable Severe Pain.—Care should be taken to make sure that the physical signs present are in proportion to the symptoms. Instances of laminectomy performed for hysteria are, in my experience, on the increase. On the whole, the worse the symptoms and signs are before the operation, the better the result.

Arthrodesis

Arthrodesis is the operation of choice in spondylolisthesis causing sufficient local capsular pain, or setting up traction on the relevant lumbar nerve roots with consequent bilateral sciatica. It is the only effective treatment for anterior protrusion of the whole disk (mushroom phenomenon), and is well worth carrying out in patients under 60. It is also indicated in recurrence after laminectomy if conservative measures fail.

Prevention of Recurrence

Advice to the Patient

The mechanics of lumbar disk protrusion must be explained to the patient, who often imagines that septic foci, choice of food or underclothing, or damp working conditions affect his back. He must be told that so long as his lumbar spine is held in lordosis the joint tilts so that the front is more widely open than the back; in this position movement backwards of the loose part of the disk is virtually impossible (Fig. 1). He must be shown how to stand, sit, bend, and lift, using his knees rather than his back. Neurosis is prevented by explaining that the disorder is purely mechanical, and not the precursor of a crippling disease capable of spreading to other parts of the body. With some exceptions he can go on doing whatever he did before; it is merely the way of doing it that has to be changed.

Patients who find that bending forward hurts often practise this movement vigorously, hoping thus to overcome what to them appears stiffness. This movement defeats its own ends by tending to increase the degree of posterior protrusion. Well-meaning friends often urge exercises on patients with backache; these are all at best harmless. In most hospitals only prone-lying trunk-extension exercises are now prescribed; this is a great advance. They do, however, have two disadvantages over the avoidance of active exercises altogether: (1) When the sacrospinalis muscle contracts it first compresses the spinal joints as far as they will go; it is only when this slack has been taken up that the extension movement begins. (2) The greater the mobility at a joint containing a fragmented meniscus, the greater the liability to internal derangement.

Hence exercising the joint towards *full* extension is less satisfactory than maintaining it as still as possible in *slight* extension.

Support

A Plaster Jacket.—This is a method in great vogue at the moment, but I believe it is seldom worth the discomfort it entails. It is usually employed wrongly—that is, in the hope of securing reduction rather than of maintaining it. It is a mistaken policy to put a patient with an annular protrusion into plaster, for I have reduced such displacements by one manipulation after as long as six months' vain immobilization. By contrast, pulpy herniations do sometimes reduce themselves slowly in plaster, but these are the simple ones that do so much more quickly when treated by sustained traction or recumbency. The results of treating sciatica with and without a plaster jacket do not appear significantly different. It is a palliative measure useful for relieving acute symptoms. Moreover, I have found that patients with gall-stones, peptic ulcer, or merely prone to indigestion usually cannot tolerate plaster; neurasthenic patients with disk lesions demand the removal of the cast within a few days. It is thus only in the exceptional case that plaster is required. One untenable reason for immobilization has been expressed: that rest in plaster allows the broken cartilage to unite. Intra-articular cartilage has no blood supply, therefore it cannot heal at a spinal joint any more than at the knee-joint. The real indication for a plaster jacket is—as for a fracture—the maintenance of reduction in cases of marked instability until a bespoke corset is ready. If a good corset cannot be obtained in a few days, and the patient keeps having recurrences, a plaster jacket may be kept on until the corset is ready.

A Corset.—Whereas a plaster jacket cannot be worn for longer than some months, and thus cannot provide lasting protection against recurrence, corsets, renewed each year or two, can be worn indefinitely, thus affording permanent security. If the two steels are accurately moulded to the lumbar curve, lordosis is maintained and the joints steadied. Moreover, if the patient bends too far forwards or sags as he sits, the front of the corset presses unpleasantly against his lower ribs—a salutary reminder.

Repeated crippling attacks of internal derangement in spite of adequate precautions once more raise the question of laminectomy.

Figs. 3 and 4, which appeared originally in the author's book *Osteopathy and Manipulation*, are reproduced by kind permission of the publishers, Messrs. Crosby Lockwood and Sons, Ltd.

The total number of administrations of analgesia given by midwives in the domiciliary midwifery service in London during the first six months of the present year was 4,929, or 66% of all the confinements which the midwives attended. This applies to all classes of midwives, those of the L.C.C. and of the District Nursing Association and the hospital district midwives. It is stated that the opportunity of receiving analgesia is given in all cases. The confinements where it is not recorded as having been administered consist mainly of those attended by doctors (concerning which no information is available of the analgesia or anaesthetic administered), women who do not wish to receive analgesia, women who are medically unfit for its administration, and confinements where labour is precipitate. All the 123 L.C.C. midwives, the 30 midwives employed by district nursing associations, and the 84 employed by hospitals on district work are qualified to administer analgesia. The percentage of confinements in which analgesia is administered has risen steadily. For L.C.C. midwives alone, the percentage of confinements in which analgesia was administered was 34 in 1948, and 68 in the first six months of 1950.

MARS AND AESCULAPIUS

A NEW ZEALAND MEMORIAL ORATION

BY

Sir ARTHUR PORRITT, M.Ch., F.R.C.S.

[*During his recent visit to New Zealand, his native country, Sir Arthur Porritt delivered an oration at the biennial meeting of the New Zealand Branch of the British Medical Association. The oration was the first to be given in memory of members of the New Zealand Medical Corps who lost their lives in the two world wars. We print below an abridged version of an address which must have given special pleasure to its audience.*]

This address must perforce to some extent be personal, but it is my aim to draw from these personal reminiscences deductions which may help to provide such practical and constructive answers to some of our national, professional, and individual problems as one feels would have been endorsed by those whom we are remembering to-day. In the main they were not dramatic heroes, they were not military geniuses, nor were they giants of the medical and scientific world. They were good New Zealanders, good doctors, and our friends, welded together in an inflexible purpose by the furnace of war.

Hence my title—Mars, the god of war, and Aesculapius, the god of medicine. Mars was always represented as a powerful, eager, virile youth (not the helmeted blood-stained brute of modern cartoons), and Aesculapius as an old bearded man, slightly bent, and leaning on a staff around which was entwined a serpent, the emblem of wisdom. The legendary end of Aesculapius is sad and yet prophetic. As a result of a complaint laid by Pluto that mortals were dying too slowly (presumably thanks to the good offices of Aesculapius), and that therefore Hades was being depopulated, Zeus slew him with a thunderbolt. It is comforting to remember, however, that, at the request of Apollo, Zeus subsequently placed Aesculapius amongst the stars for ever and ever, thus symbolizing medicine in perpetuity. . . .

It is from two angles, therefore, that I wish to speak of those of our friends who have gone on—as New Zealanders and as doctors—broadly, though not entirely, in relation to the two cataclysms through which most of us have passed during the last few decades. When one thinks of these last fifty years—Edwardian comfort and complacency, the rude awakening of 1914–18, the spurious artificial prosperity and depression of the inter-war period, the second holocaust, and the years of inevitable reaction, with the stark realities of moral and economic failure lurking just round the corner—is it any wonder that those who have lived five generations in one should feel some measure of instability, should find it difficult to assess their values, should perhaps feel older than their age, and should search consciously or unconsciously for some firm rock of faith to which to cling?

I feel that those we honour to-day had found such a rock. They were New Zealanders. Let us not shut our eyes to the fact that with a short history of little more than one hundred years we have a great tradition. . . . In this young country few of us have got beyond the third generation of New Zealanders, but our grandfathers and fathers were of rugged stock—independent, God-fearing, self-reliant—the real pioneers. Their legacy of virility and stout-hearted adventure has been intensified by the lovely country of our birth. . . . Most of us know far too little of this country of ours—its history, its economic assets, its

development, its wealth of beauty in scenery and flowers and birds. It should be impressed on every New Zealand child that so far as his circumstances allow he should aim to know his own country inside out before he travels from its shores.

The New Zealand Soldier

[Sir Arthur Porritt went on to speak of three groups of New Zealanders who had helped to put the country "on the map" during the last 30 or 40 years—the New Zealand Divisions in two world wars, New Zealand athletes and sportsmen, and certain noteworthy individuals, such as Lord Rutherford in science, Sir William Marris in diplomacy, and Sir Harold Gillies and Sir Archibald McIndoe in medicine. Of the New Zealand soldier he said:]

New Zealand had produced some doughty fighters in the Boer war, but it was the 1914–18 war which first really brought them to the fore as a national military entity. Their deeds of derring-do in the Middle East, in Gallipoli, in France, carried out with a dash which would have been almost bravado had they not been accompanied by a steely discipline and precision such as might have been expected more from seasoned regulars than from casual volunteers, their morale, comradeship, and friendship became by-words in the British armies. Their record has proved to be one which even another and greater war and thirty intervening years have not dimmed in perspective.

[Here, before passing to some personal reminiscences of the Second New Zealand Division, Sir Arthur Porritt mentioned that one of the original band who went with the First Expeditionary Force to Samoa in 1914 and ultimately returned to New Zealand in 1919—a doctor and a soldier—was to his great delight present on this occasion: the orator's father (Dr. E. E. Porritt, F.R.C.S., of Wanganui, N.Z.).]

During two years' service with the British Army in the Middle East in 1941–2 I personally saw much of the Second New Zealand Division from a medical angle. The medical officers of that division and its attendant military hospitals were my contemporaries and friends of Otago days. I do not think there was a New Zealand hospital in the Middle East that I did not find excuse to visit at some time during that period.

At work in a British unit and generally unrecognized as a New Zealander, it was a great joy to me to hear the constant and repeated praise of the New Zealand Division, not only as a fighting force but as individuals. . . . It was always a great delight to me to have New Zealand patients in the six to seven hundred—sometimes a thousand—surgical beds of my division, and I like to think that to those patients it was a consolation to find a New Zealander in charge. At one time after Greece and Crete we had well over 500 New Zealanders in at the same time. Nor did the liaison stop there. One of my best surgical specialists was a New Zealander, and so was the British consulting surgeon to the Middle East—a well-known character to most of you—General "Jock" Monro. I feel it is not my province to trace that historical pilgrimage from Alamein to Tripoli, to Sicily, and on to Italy in detail, but I should be lacking in my bounden duty if I did not underline the enormously stimulating effect the New Zealand Division obtained from its quite unique leadership. Here was a New Zealander of New Zealanders, whose inspiring personal example, apart altogether from his military genius, was almost enough by itself to ensure the success of any formation. As a soldier, as a sportsman, as an individual, Sir Bernard Freyberg has certainly done his fair share in putting New Zealand "on the map."

[After referring to the popular welcome of the New Zealand soldier in the home country, Sir Arthur Porritt mentioned the sportsmen and athletes of New Zealand. New Zealand had just had the honour of staging the first post-war and "biggest ever" Empire Games, which had been an unparalleled success.]

Here in the development of a thousand friendships through a common interest in sport lies one strengthened link in the chain of the Empire. Furthermore, to those of us who are doctors these games should embody the ideal of national physical fitness. In New Zealand the standard is already high. Let us strive not only to maintain but to raise it. A life without health is less than a life, a nation without health is at best second-best, an empire without health is on the way out. The future of medicine undoubtedly lies not in curing diseases but in maintaining health.

[In mentioning some New Zealand achievements in sport he spoke of the exploits of Jack Lovelock—"an Aesculapian like ourselves." "I can see him now in that gigantic stadium in Berlin . . . a seeming pygmy among giants, but with superb track sense and an inflexible determination to succeed, run the best eight milers off their feet to register New Zealand's first athletic Olympic victory in record time."]

Expatriate New Zealanders

[Reference to some famous New Zealanders in the world of affairs brought him to one controversial point which should not be glossed over.]

They are all expatriate New Zealanders. How does it come about that their great work has been done elsewhere? In many cases it is sheer force of circumstances; in others the lack of facilities sufficient to allow them adequately to exhibit their skill and ability to the full. In neither of these eventualities need New Zealand accept any blame, for blame there is none, on either side. Nor need she bemoan her loss, for such men do infinitely more to enhance her prestige in the world at large by remaining outside her shores than, with the inevitably limited facilities available, by staying in New Zealand.

Let us admit frankly, however, that this by no means answers the whole question, and it would seem a matter of no small importance in New Zealand's present stage of development to restrict to a very definite minimum this export of brains she badly needs. This is a matter for politicians, educationalists, and industrialists alike. Too many good young New Zealanders in varied fields of activity go or are sent abroad to widen their experience and extend their knowledge, and, having done so, find to their great disappointment that New Zealand makes no attempt to encourage their return, and that if they do come back reasonable opportunities are unobtainable. This state of affairs can and should be remedied. Spending of money—even State money—on worthy objects can often in the long run be an economy, and what more worthy object than a young New Zealander specially trained in his own particular sphere who wishes to devote his talents to his own country?

[He then spoke of New Zealand doctors, nearly all of them, like himself, graduates of Otago University.]

New Zealand graduates in pre-war days were accepted at face value—known to be well-trained, skilful doctors. They still are, but not perhaps to quite the same extent. Reasons for this lie on both sides of the world. Within the limits of the clinical material available a New Zealand graduate can bear comparison with the best, and probably win. Such were the doctors with whom the New Zealand Division was blessed. Add to their professional background the possibilities of a wide experience of travel and of the closer co-operation and opportunities for friendship and understanding which come automatically with military service, and you will appreciate what a chosen band they were.

Under their very eyes, through their own hands, the stimulus of war was being applied to medicine. Mars, with one hand reaping that terrible harvest of human lives, was with the other prodding Aesculapius along to prodigious feats. Just as the first world war established orthopaedic surgery as an entity, so has the second opened up vast possibilities in the surgery of the chest, of the brain, of the blood vessels. Three handmaidens of surgery contributing to this result are the dramatic improvement in anaesthetic methods, the immensely increased use of the life-saving blood transfusion, and the advent of first the sulphonamide drugs and then penicillin and the antibiotics. Many of us came to divide our medical war into three stages—the pre-sulphonamide, the sulphonamide, and the penicillin.

In the first, the stage of the B.E.F. in France in 1939–40, sepsis in war wounds and septicaemia were still rife; in the second, the stage of the Middle East campaigns, the sulphonamides had to a very large extent prevented generalized infections, but every local wound was potentially if not actually septic; in the third, the stage of Normandy, of Italy, of the Far East, penicillin made septic wounds the exception rather than the rule.

[The orator described other wartime advances in medicine—the advent of drugs which had almost abolished dysentery and typhoid in armies fighting in hot climates; the improvement of mechanization whereby surgery was gradually taken right forward to the wounded man in small units; the arrival of the nursing sister in these forward surgical units, bringing with her that human touch essential to preserve the flickering flame of life in severely wounded men.]

The Service Doctor

But it was not only in these direct ways that stimulus and interest came to the Service doctor. More than ever before he became invaluable as a "back-room boy," studying and elucidating problems which had a great if incalculable effect upon many of the major campaigns. By this I mean such problems as the efficient protection of life and limb in tanks and armoured vehicles; the variety of food and clothing to provide the correct level of sustenance and cover in a dozen different climates; the study of remedies to prevent sea-sickness in assault landings; the investigation of effects of variation in atmospheric pressure and speed on pilots and submarine personnel; and many other fascinating problems in which it was found that clinical knowledge, physiological data, and scientific fact were of prime importance.

Just one other point perhaps remains to be considered. In the war we were working in a regimented State-controlled service. Were the results efficient? Were the personnel satisfied and happy in their work? In all fairness the answers must be, by and large, that they were. Why, then, does a civilian State service go so largely against the grain?

Admittedly the circumstances are different. However much we would like it to be so in these difficult times of peace, we know that the sense of urgency to achieve cohesion of purpose at any personal sacrifice is not of anything like the same potency. Let us remember, too, that in the Services both doctor and patient were being clothed, fed, transported, and generally cared for free of individual cost. Let us not forget that in all medical services it was only when the cast-iron bureaucracy of administration, excellent as it admittedly was, had been made reasonably malleable by the unquenchable clinical flame of those large numbers of our professional colleagues temporarily under arms that a really co-ordinated and efficient service resulted. There were many hard lessons learned on both sides, but it was worth it. No machinery, however good, will run a profession. The economic as well as the efficient administration of any medical service depends upon its ability to encompass the personal idiosyncrasies of both patient and doctor within reasonable limits. Because the profession, being doctors, realized the many difficulties of achieving this end, they would appear to have lost the "kudos" for the conception of a comprehensive medical service for all; but it was a medical idea and ideal long before it became one of the more important planks in a political platform.

What the ideal State medical service should achieve is that no individual is denied the facilities medicine has to offer. By "facilities" I mean institutions—hospitals, sanatoria, health centres—also instruments and drugs. These are the inanimate objects that can be nationalized to the great advantage of all, particularly if good medical advice is taken on how it should be done. It is not the idea of the State schemes which is at fault; it is the precipitate, relatively thoughtless implementation of them that has led to so many unfortunate complications. . . .

I believe strongly that there is a great deal of good in most of these schemes, but such good will be watered down just to the extent to which any particular scheme inhibits the incentive, the initiative, or the independence of either partner—the doctor or the patient. It is not the politician of to-day who will suffer from an ill-conceived scheme, but the patient of the future. Such a possibility we, as medical men, must prevent at all costs. As a profession, from the very nature of our work we are, and have proved ourselves to be, poor hands at producing a united and concerted effort. A man who, night and day, is facing up to the responsibility of dealing with the individual physical and psychological problems of his fellow men is, generally speaking, not adept at formulating overall plans to cope even with a large series of circumstances and conditions, and far less a large series of people.

But at least each of us can take out of the back cupboard his moral values and see to what extent they allow him to support this scheme or part of a scheme or strongly oppose another. I am sure that we all now have to make this individual effort if we are to ensure the best treatment for our present and future patients, safeguard a generation of the profession still unborn, and be as good doctors as God and Otago University may make us. . . .

[Reverting, as he concluded, to his main theme, a tribute to the men of the N.Z.M.C. who lost their lives in war, Sir Arthur Porritt said:]

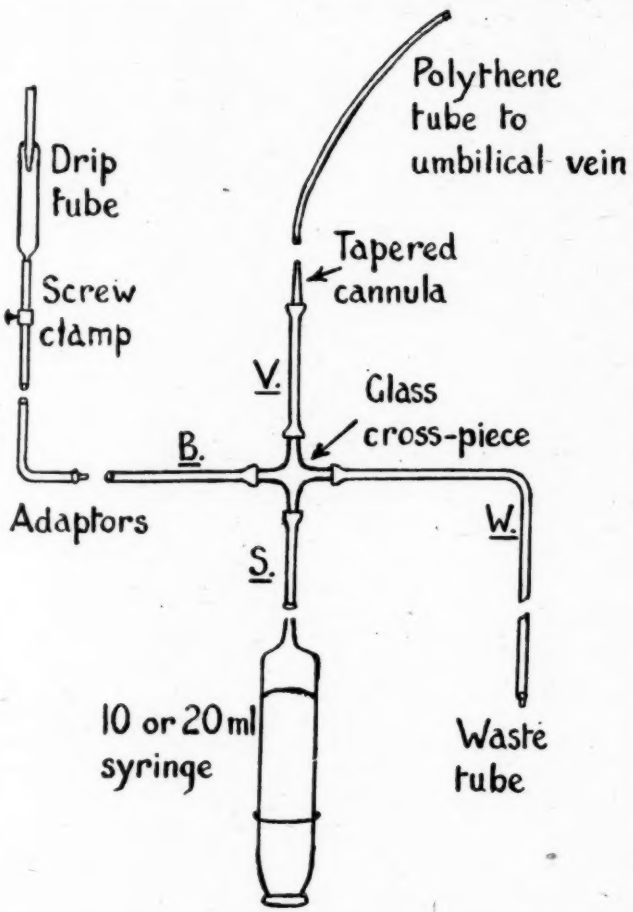
Time in his comforting and effortless way is steadily deadening that sense of personal and professional loss we felt when these good men departed. He has pushed Mars back—well back, we trust—into the shadows of the past, but he has led out a rejuvenated Aesculapius into the limelight—one might say the floodlight—of to-day and the future.

The second annual report of the Scottish Society of the History of Medicine says that an increasing number of North of England members are being enrolled. Three meetings were held during the year: a discussion on the teaching of the history of medicine; a paper on the history of British dentistry since 1685; and a full day devoted to papers by two distinguished American visitors on the history of Johns Hopkins University and on the life and work of John Morgan, founder of the first medical school in America (Philadelphia, 1765), followed by a pilgrimage to places of medical interest round Edinburgh.

Preparations and Appliances

THE "CAMBRIDGE" EXCHANGE TRANSFUSION OUTFIT

Dr. C. B. V. WALKER, director of the Regional Transfusion Centre, Cambridge, writes: The technique of exchange transfusion via the umbilical vein in cases of haemolytic diseases of the newborn was first developed by Diamond (1947) in the U.S.A., and the apparatus required has been described by Mollison *et al.* (1948) in this country. A modification of this apparatus has been tried clinically with success in the Cambridge Regional Blood Transfusion Centre. The main points of difference are: (1) that the use of three-way stopcocks has been entirely dispensed with, and irritating delays due to the joints



becoming dislodged in the course of the transfusion have been obviated; and (2) a tapered cannula has been incorporated into the outfit, which not only prevents leakages due to a poor fit between the polythene tube and the cannula on account of variations in the internal diameter of the polythene tube, but the operator can select the size of tubing he wishes to use, on clinical considerations, and fit it forthwith to the outfit without previously ascertaining that a tightly fitting cannula is available.

As shown in the diagram, the set comprises a cross-piece made of ¼-in. (0.6-cm.) glass tubing, each arm of which is 1 in. (2.5 cm.) in length, and is corrugated to give a firm purchase for the attachment of a rubber tube. In the following description the letters B, V, W, and S refer to the arms of the cross-piece connected to the blood bottle, umbilical vein, waste, and syringe respectively. Arm B is provided with about 3 in. (7.5 cm.) of rubber tubing mounted with a female Record-fitting adaptor, as used in the distal part of the normal administration set supplied by the National Transfusion Service. This adaptor is designed to receive the corresponding male adaptor of the Transfusion Service outfit. Arm V has 2 in. (5 cm.) of rubber tubing mounted with an Alban Andrews tapered cannula, and is designed to receive polythene tubing of a reputed internal diameter of 1 mm. or 1.5 mm. as desired by the operator. Arm W has a rubber tube about 2 ft. 6 in. (75 cm.) long mounted at the distal end by a male adaptor; this is the tube by which the extracted blood is run to waste. Arm S has 2 in. (5 cm.) of rubber tubing mounted with a metal adaptor to take a 10-ml. or 20-ml. Luer-fitting syringe.

It is desirable that the length of rubber in arms V and S be kept as short as possible, to minimize the amount of "dead space" in the outfit. The exact length of rubber on arm B is unimportant.

If an operator prefers to use a Record type syringe, it is a simple matter for tube S to be fitted with a suitable adaptor when the outfit is being assembled. The only other equipment needed consists of two haemostat forceps.

A bottle of suitable blood is fitted with a standard giving set in the ordinary way, air in the delivery tube is removed, and the screw clamp closed. The set is then connected to arm B of the exchange outfit. Haemostats are clamped on the rubber of arms V and S, and the syringe is attached to arm S. The screw clamp of the standard set is then adjusted to deliver a fast drip through the waste pipe, arm W, and when this has been done the rubber of arm B is at once clamped with the haemostat from arm S. Then a polythene tube of suitable diameter, 1 mm. or 1.5 mm., is introduced into the infant's umbilical vein and connected to the tapered cannula. The clamp on arm V is transferred to arm W (waste), and the syringe is filled with the infant's blood by suction. The clamp is then returned from arm W to arm V and the blood in the syringe is discarded.

The exchange transfusion may now begin. The clamp on tube B is transferred to tube W and the syringe filled from the bottle of blood. The clamp on tube V is transferred to tube B. The syringe is emptied into the umbilical vein and refilled from the vein by suction. The clamp on tube W is transferred to tube V and the syringe emptied through the waste pipe. The clamp on tube B is then transferred again to tube W and the cycle repeated until the whole 500 ml. in the bottle has been used.

The point to note is that once the exchange transfusion has begun the two haemostats circulate between tubes B, W, and V in that order, and the vacant tube is clamped, at the appropriate point in the cycle, by the use of the haemostat from the preceding tube, the above convention being kept in mind.

The outfits, as issued by the Cambridge Centre of the National Transfusion Service, are supplied in a "cellophane" wrapper in a 2×4×11-in. (5×10×27.5-cm.) tin, which also contains a standard giving outfit minus the distal needle unit, and also two 8-in. (20-cm.) lengths of sterile polythene tubing of 1 mm. and 1.5 mm. internal diameter packed separately in straight glass tubes with cotton-wool plugs and cellophane wrappers. The polythene is sterilized by steaming at atmospheric pressure in the autoclave for 30 minutes on three successive days (Tyndall's method). It should be noted that the contents are packed in the tin after sterilization. It follows that the outsides of the cellophane wrappers are not to be regarded as sterile.

A further distinct advantage in this type of outfit consists in the fact that all parts are easy to dismantle, inspect, and clean thoroughly before reassembly, and the design lends itself to multiple production at a Regional Transfusion Centre. It has been found almost impossible to be sure that the metal three-way stopcocks of the original method have been cleansed completely from fragments of residue from previous use.

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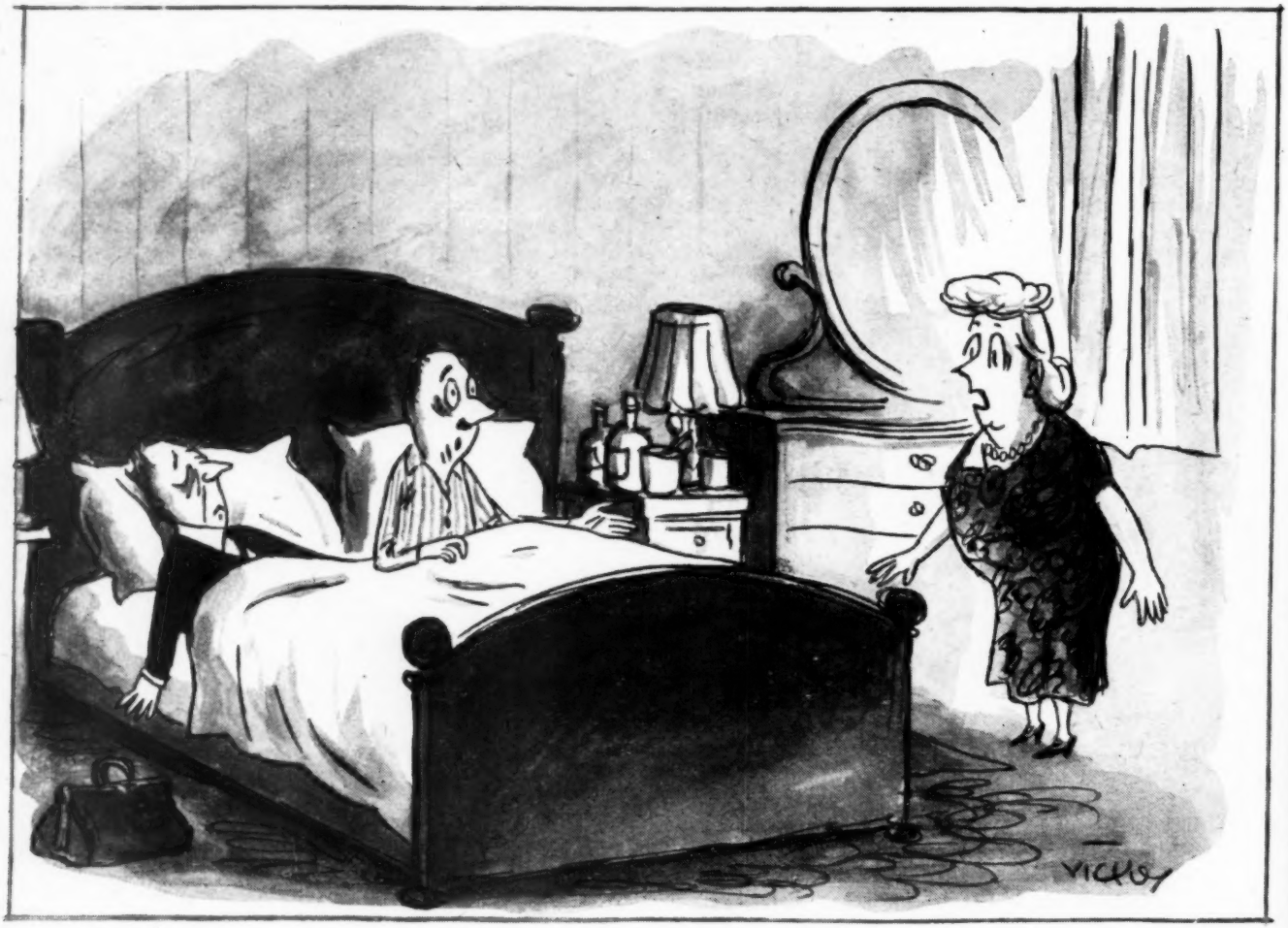

"The Doctor was *so* tired, Dear."

HAPPY CHRISTMAS!

The Editor and his staff, in sending the usual greetings of the season, are aware that the serried columns of portentous print of the *B.M.J.* keep them impersonally remote from their readers. This, of course, has its advantages. When the man with the burning message finds the chill waters of editorial disapproval poured on it he at least doesn't feel that his best friend has pushed one of his disks out. He can pour out the vials of his wrath on that somewhat monolithic abstraction the Editor. But behind the severe black-and-white of our austere pages there are human chaps at work, back-room boys all, longing at times to burst out into licentious song, but restrained all the time by professional decorum and—believe it or not—a desire to be fair even to the most unfair.

Some readers have begged us to be funny. We must reply in the terms of an article in a contemporary journal: "This type of personality was absent in 10% of their patients." Nice to think you can have an absent personality. The funny things are there if you look for them. We find them, in a quite unbiased way of course, in other journals. At this time of the year this message comes straight from the heart of a leading article: "The part played by heavy meals shortly before bathing deserves critical examination." One can see those heavy meals gallantly playing their part before the severe eye of a dyspeptic critic. And for those who go in for higher thinking comes this reassurance from a reviewer: "A brief section takes the reader as far as he needs to get a proper grasp of the betatron, the synchroton, and the latest form of linear accelerator." This irresistibly called up a picture of Harpo Marx grasping, and quite properly, a linear accelerator. Knowing how easy it is to err, our editorial hearts beat an extrasystole of sympathy when we read this confession from a contemporary: "By an error which we much regret, we last week printed under this heading the review of a different book. The proper review will be published shortly." And from the same and highly esteemed organ of opinion came this startling—the only word to use is—revelation: "Most people seem to think that the vaginal passage runs straight up and down the body—a misapprehension sustained by the usual neat diagrams showing the uterus poised on top of the vagina." Some misapprehension!

Editorial humour being in short supply, we have invited two whose wit in cartoon and verse has pierced many a dark corner to illumine the contemporary medical scene. Vicky and Sagittarius are impressed with two things—the overworked doctor and the over-doctored patient. They are the expert witnesses, and what they say is there to be seen and read.

May we close by hinting that medical editors share with their colleagues in practice the privilege of being driven too hard. Our noses are dipped alternately in the paste-pot and the ink-bottle. With difficulty the editorial head is kept above paper, and the printer's devil is ever at his elbow. And after each week's journal has gone to bed there is the sudden waking in the night and a horror that what had better not be committed to print is now beyond recall. Then the pangs of conscience about unanswered letters and an ever-mounting pile of unread manuscripts. A long correspondence about a rejected manuscript from a foreign colleague ended by his remarking, "I am not trying to make of you a jumping Kangaroo, but I suppose not all the obstacles impossible to be removed or to be overcome." On this hopeful note we shall soon enter the New Year.

[Cartoon is by Vicky of the *News Chronicle*.]

THE DOCTOR AND THE MINISTER

"Now that we have got the National Health Service based on free prescriptions, I shudder to think of the ceaseless cascade of medicine which is pouring down British throats."—Mr. Aneurin Bevan.

The queues were grousing cheerfully
Beside the Doctor's door;
They would not go away without
The mixture as before,
And this was odd, because he said
They needed it no more.

The Doctor and the Minister
Were sitting hand in hand,
They wept like anything to see
The mixtures in demand.
"If they could be reduced by half,"
They sighed, "it would be grand!"

"One hundred million pounds per ann.
For mixtures we must vote.
The liquid doses that each day
Flow down the nation's throat,
If emptied out, would make a sea
On which the Fleet might float."

"The time has come," the Doctor said,
"To talk of vitamins,
Of carbohydrates, mineral salts,
And calories and greens,
Of fats, fresh air and exercise,
Biology and beans.

"But *Mist. Pot. Brom. et Nuc. Vom.* has
An almost mystic charm,
And if it does but little good,
It works but little harm."
"The Health Bill," sobbed the Minister,
"I view with grave alarm."

"I sympathize," the Doctor sighed,
"But still I greatly fear
If *Mist. Sod. Cit.* should be cut down,
Your votes would disappear."
"I know it," said the Minister,
And shed a bitter tear.

"You patients," cried the Doctor, "who
By bottles are allured,
Can run away and play to-day;
Your aches and pains are cured."
"If that is so," the patients said,
"Then why are we insured?"

The oldest patient winked his eye
But budged not from the spot.
"Tell that to the Marines," he said,
"We've come for you-know-what!"
"Nine million bottles seem," remarked
The Minister, "a lot."

The patients cried, "It's most unkind
To cross us off the list.
The doctors don't know everything—
Our aches and pains persist."
The Doctor rudely cried, "O, *Nux!*"
Then sadly wrote, "*Rep. Mist.*"

The Doctor and the Minister
Saw nothing could be done
As happy queues went skipping off
In search of Christmas fun;
Which was not odd, because they had
A bottle, every one.

SAGITTARIUS.

Correspondence

Displaced Registrars

SIR,—As a general practitioner I would like to protest at the recent cut in registrars. The registrars have stated their own personal problems, but let the rest of the profession realize what these dismissals mean. Before, the axe has fallen on hospitals and hospital expansion; now it is falling on the personnel of the service. How long before it will be our turn? Can we expect to improve our own conditions either in capitation rate or working conditions if we make no attempt to prevent this injustice?

Not only is any future improvement of the specialist services postponed by this cut, but it immediately throws 1,100 doctors into the general-practitioner market, and they could be used to dilute it. If the number of registrars is too many there must be an immediate need for increasing the number of posts with a specialist's status, otherwise there will be a fall in the quantity of out-patient consultations and in in-patient treatment. If there has been an excessive influx of the younger members of the profession into registrar jobs this is due to the unattractiveness of general practice, which implies the need for a reduction in the maximum number on the lists with an increase in the capitation rate.

In these matters the whole profession should work together and demand the withdrawal of this cut, and remove uncertainty from the future for registrars, for their future is ours.—I am, etc.,

Abersychan, Pontypool, Mon. A. S. JARMAN.

Training Registrars

SIR,—Now that the somewhat overdue review of registrar appointments is being undertaken is it not time for an equitable scheme for the training of consultants to be considered? At the moment there appear to be two classes of registrars, those at the teaching hospitals and those in the non-teaching hospitals. This has led to a very unfair discrimination in obtaining appointments, since the registrars from the non-teaching hospitals applying for consultant posts are often turned down on account of their lack of academic training. Would it not be better if the responsibility for the training of consultants and specialists could be fully undertaken by the teaching hospitals, with their university and academic background, and at the same time the large amount of practical experience offered by the non-teaching hospitals utilized in their training?

The following suggested scheme has been discussed with many of our colleagues, and met with their whole-hearted support.

The training of consultants and specialists shall be the entire responsibility of the teaching hospitals within the region. The number of trainee specialists entering upon a course of training each year shall be a fraction greater than the number of consultant and specialist vacancies occurring each year, in order to provide for wastage and competition. It is thus a definite trainee/vacancy ratio. The scheme should provide for a six-year training in which each trainee spends part of the time in the centre and part at the periphery. There shall be trainee posts six times the number of the estimated yearly output of trained specialists.

These trainee posts shall be allocated one-half to the recognized teaching hospitals and one-half to selected peripheral hospitals. The trainee shall move each year in accordance with a rotation plan such as first year in teaching hospital, second year in peripheral hospital, third year in teaching hospital, fourth year in peripheral hospital, fifth year in peripheral hospital, sixth year in teaching hospital.

The remainder of the peripheral hospitals in a region should have added to their staffs such further consultants or junior registrars as assistants as may be deemed necessary to carry out the work in each case.

Each year the vacancies in consultant posts should be open to competition by the specialists trained in accordance with this scheme or by consultants already in other posts.

The scheme is elastic and can be applied equally to each and every branch of consultants and specialists, since the number of trained specialists coming out each year bears a definite ratio

to the number of vacancies in each branch. Some alteration in the set-up of the teaching hospitals is inevitable, but as against this the whole of the training will be under their direct control. The consultants in the selected peripheral hospitals have an added incentive to keep their standard up to that of the teaching hospitals. The scheme eliminates the variation in standing of a trainee, since each receives both central and peripheral training, and at any stage it can be observed in which direction he is developing, and the training adjusted accordingly.

If the principle is accepted by the teaching hospitals, in order to set the scheme in operation the present registrars who are willing to transfer could be selected and appointed; the remainder should be allowed to finish their appointments under their existing contracts.—We are, etc.,

L. M. BILLINGHAM.
J. W. LACEY.

Chelmsford.

Registrars and Health Service Policy

SIR,—The proposed treatment of registrars is entirely uneconomic; these men have received long, expensive, and sometimes State-aided training; they have had the benefit of considerable experience in their specialties; they are, in fact, particularly valuable members of the profession. Secondly, the plan is both unjust and inhumane; these registrars, frequently with war service behind them, were misled by suggestions that there would be a great increase in the number of specialist jobs under the Health Service; they were encouraged to carry on training by Government grants and supernumerary appointments. It therefore behoves consultants to stand solidly behind them and see that the plan is altered.

The problem is obvious—too many training for too few jobs—and it can be tackled at both ends. First, we need more consultant appointments, and, if it is financial stringencies that are preventing them, there are many obvious ways of saving money in the Service—e.g., charging for spectacles, dentures, appliances, board and lodging while in hospital, etc. Furthermore, we should if necessary offer our merit-award money for the payment of new consultants. Secondly, we should slow down training. This should be done as any manufacturer would do if faced with a diminished demand for his goods: not by destroying stocks of the finished product but by slowing down production at the beginning until all the stocks are used. This policy would be achieved by allowing all present senior registrars who are suited to their jobs to remain in them indefinitely if they so desire, with the knowledge that in perhaps eight years there will be consultant posts for all who are of sufficient calibre. This blocking of the senior posts would discourage new entrants into the ranks of trainee specialists, and better be discouraged at the start than after full training.

Finally, I would add this. We are seeing the result of miscalculation and incompetent planning; are we sure that the same problem will not arise in regard to general practitioners? Each year our medical schools turn out more doctors—I believe my own school is planning to turn out twice as many as before the war—and yet I understand that the money available for paying general practitioners is constant. Are these increased numbers of doctors required, and, if so, can they be paid? This must be thought out now and not left until we are faced with large numbers of unemployed doctors.—I am, etc.,

PAUL HICKINBOTHAM.

Leicester.

Producing Anaesthesia of Trigeminal Nerve Distribution

SIR,—I am most interested in the letter (December 9, p. 1334) from Messrs. Brodie, Hughes, and Small, describing the occasional difficulties they have met with in resecting the third division of the sensory trigeminal root. Certainly the fibrous septum they describe running from the ganglion far into the sensory root might explain the difficulty of infiltrating the whole root with alcohol, but it would not explain the preservation of sensation in the mandibular branch unless a bundle is overlooked or intentionally left uncut in mistake for the motor root.

To obviate this, I would suggest using Frazier's method, which he adopted and published in 1919, for saving the motor root. He describes this root as issuing from beneath the ganglion, wrapped in bundles of sensory fibres, which he separates with the use of a faradic electrode, cutting only the fibres which do not respond by contraction of the temporal muscle.

I have included Frazier's account in a "History of the Treatment of Trigeminal Neuralgia," which the editor of the *Postgraduate Medical Journal* asked me to write, and which will appear shortly.—I am, etc.,

WILFRED HARRIS.

London, N.W.1.

SIR,—I would refer Mr. Brodie Hughes and Mr. J. M. Small (December 9, p. 1334) to Sicard (1932), who after a painstaking anatomical study of 42 cases wrote: "Nous pensons donc pouvoir conclure que, dans 25% environ des cas, *la racine motrice contient des fibres sensitives* soit par l'intermédiaire d'une grosse radicule venant directement du ganglion de Gasser, soit par l'intermédiaire d'une anastomose plus ou moins grêle avec une radicule sensitive. Ces fibres permettent d'expliquer la persistance ou le retour d'une légère sensibilité que l'on observe parfois dans le domaine du maxillaire inférieur après neurotomie totale et conservation de la racine motrice" (his italics). His drawings are convincing. The closer to the pons a sensory rhizotomy is made, the more likely the escape of these overcrossing fibres, so that one would expect the relapse rate to be higher after suboccipital than after subtemporal rhizotomy. This has been the experience of Olivecrona (1947), who found the respective rates to be 17.7% and 8.5%, and of Guidetti (1950), who found them to be 17.9% and 8.3%.

The immediate post-operative persistence of both sensation and the pain of tic douloureux despite complete sensory rhizotomy can probably be explained in no other way. For a delayed return of sensation and pain after initially adequate anaesthesia there is another possible explanation. Ganglion cells were found scattered in the sensory root in one human case by Stibbe (1936) and in three by Ferner (1940); if the sensory root were divided distal to such cells, the centrifugal fibres arising from them might regenerate.

When tic douloureux in the mandibular division is cured by rhizotomy, yet some sensation persists there, a third explanation must be considered—namely, overlap of the trigeminal area with that of the cervical nerves. Lewy (1938) claimed to demonstrate by quantitative electrical tests that this overlap always existed, though usually not demonstrable by ordinary clinical methods.—I am, etc.,

JOHN PENMAN.

London, W.1.

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Antihistamines and the Common Cold

SIR,—I have read the report (August 19, p. 425) and articles on the use of antihistamines in the prevention and treatment of the common cold with considerable interest but real disappointment, and I would like to reply.

The antihistamines, when used in the therapy of the common cold, probably are effective in correcting disturbed physiology only. They have little or no effect either upon the pathogenic organisms causing the disease or upon its fully developed pathology. The early symptoms of the common cold as well as those of many other infections and varieties of trauma of the respiratory tract represent disturbed physiology, with developing acute inflammatory oedema as the demonstrable lesion. As such it is reversible. Sneezing, rhinorrhoea, lacrimation, and the unproductive cough are actually exaggerated and often inappropriate physiological responses to non-specific irritant stimuli. The reaction is diffuse when caused by physical agents and inorganic chemicals. When due to viruses or bacteria, it assumes an allergic character and becomes sharply localized. When this sharply circumscribed oedematous process progresses to the point where necrosis begins to appear in the involved tissue, it becomes true pathology, is irreversible, and there is no drug or other form of therapy that will affect the lesion favourably. This can occur within six hours or less. It is believed

that this stage of the initial lesion of the common cold is analogous to the urticarial weal and the lesion of herpes simplex in humans, and to the Arthus phenomenon in laboratory animals.

There are several variable factors at play in every case where the common cold is contracted. Among these are

(1) The nature of the irritant. If it is due to a virus, or bacteria, or products from their growth, the degree of virulence is important.

(2) The size of the dosage implanted and, in the case of living organisms, the rapidity of growth.

(3) The immunity, if any, of the patient to the irritant then present.

(4) The general state of health at the time of the attack. This is governed by pre-existing pathology, the diet, vitamin intake, fatigue, and the degree of emotional adjustment

(5) The ability, or lack of it, to control the temperature and humidity of the immediate environment.

Further, it should be recognized that there are two groups of conditions and diseases which are often confused with the infectious common cold due to a virus, and are believed to have been included in most reported series of cases, including my own. These are

(*a*) "Traumatic," "allergic," or pseudo colds due to non-infectious irritants. They occur in every month of the year, in every country, in every climate, and as a group yield readily to antihistamine therapy.

(*b*) Respiratory diseases due to other viruses such as the influenzas, atypical pneumonias, measles, and those due to bacteria such as the streptococci, the exact diagnosis of which is often missed. These predominate in the winter months when human resistance is at its lowest ebb, and with the exception of those due to bacteria are refractory to all treatment.

According to our present knowledge the antihistamines accomplish their effects principally by blocking histamine and the action of acetylcholine. Thus the dose becomes the amount required to neutralize the effects of these chemicals, and not a stated number of milligrams. Furthermore, it has been my own experience that if symptoms are allowed to reappear after the first dose has been taken the cold will usually mature regardless of subsequent treatment, indicating the development of an irreversible lesion. Thus the neutralizing effect must be sustained as long as the irritant acts.

From the above it would seem reasonable to believe that colds have been and can be aborted when antihistamines are taken in adequate dosage while the initial lesion is in the stage of disturbed physiology and is still reversible, and when the effect of the drug is sustained during the action of the irritant. Those symptoms of the common cold due to disturbed physiology, and which result from the spread of the infection over the mucous membrane, can be alleviated even after the true pathology of the disease has developed.

But once definite pathology has developed no treatment can be more than palliative. The contradictory statistics reported to date accurately reflect the type of work that has been done and the results obtained. As yet no adequately scientific report has been made concerning the effect of antihistamines upon the experimentally induced cold.

I should add that all these opinions are my own, and must not be taken as representing the views of the Navy Department or the naval service at large.

—I am, etc.,

Philadelphia, Pa. JOHN M. BREWSTER, Captain (M.C.), U.S. Navy.

Causes of Death in Diabetes

SIR,—Always one appreciates comments on a printed paper, and especially some of the perfectly good points made by Dr. J. M. Sen Gupta (November 4, p. 1061). It was not my intention to give a detailed statistical presentation, because such material is available in other publications, including the pamphlet on Studies in Diabetes.

As regards the third paragraph, the reason that the total of the percentages exceeds 100 is that the item "gangrene" is a part of the total for cardiovascular renal diseases. If that entry of gangrene had been *indented* (see May 13, Table II, p. 1096) the misunderstanding would have been avoided.

I am sending the writer another publication to cover what he mentions, and will forward the same to anyone who wishes these.—I am, etc.,

Boston, Mass. ELLIOTT P. JOSLIN.

Urethra Obstructed by Crystals

SIR,—I should like to report the case of a child of 13 months who had retention of urine, due to a collection of crystals in the urethra.

The child, a boy, suffered from bronchopneumonia, and was given 2 dr. (7 ml.) "cremor-merazine," followed by 1 dr. (3.5 ml.) every eight hours with 10 gr. (0.65 g.) potassium citrate. It is possible that an over-anxious mother increased the dose. The child's symptoms cleared quickly, but on the third day he became very ill, and was in obvious pain. On examination the doctor discovered a very much distended bladder which was not relieved by the usual remedies. As the child was in such pain an anaesthetic was given, and the bladder was emptied by the passage of a ureteric catheter. The urine contained crystals which could be seen by the naked eye and were confirmed by the pathologist's report. The child made an uneventful recovery.

I have seen two previous cases this year of ureteric obstruction following "sulphamerazine," one of which had to be relieved by the passage of a ureteric catheter, but this is the first case of urethral obstruction that I have seen, nor have I seen a case reported.—I am, etc.,

Newport, Mon. J. T. RICE-EDWARDS.

Erythrocyte Sedimentation in Anaemia

SIR,—Dr. Richard Terry's admirable article (December 9, p. 1296) disposes so effectively of the method of "correction for anaemia" in the estimation of the E.S.R. that it is a pity that he thought it necessary (p. 1297) to make a ritual genuflexion in the direction of the Wintrobe technique. Surely once one has concluded that correction for anaemia is neither necessary nor desirable, the last argument in favour of this technique is disposed of. From a practical point of view the Wintrobe technique is very troublesome owing to the difficulty of filling and cleaning narrow blind-ended tubes, and the contraction of the scale from 200 to 100 mm. necessitated by the desire to use the tube as a haematocrit in order to be able to "correct for anaemia" makes the test less discriminating than the Westergren. Moreover, in my experience and that of others with whom I have discussed the problem, the Wintrobe technique gives much less reproducible results than the Westergren, when the same amount of technical skill and care is used. The only point that might still be adduced in favour of the Wintrobe technique is that since the double oxalate mixture does not affect the sedimentation rate while the citrate solution does, the Wintrobe is therefore a more "correct" method. Since, however, the E.S.R. is in the last analysis an empirical measurement of a little-understood phenomenon, surely our method of estimation should be such as can be carried out easily and reproducibly, rather than one whose advantages are purely theoretical.—I am, etc.,

Penarth, Glam. B. M. WRIGHT.

SIR,—I was interested to read the article (December 9, p. 1296) by Dr. Richard Terry. His conclusion that "hypochromic anaemia neither invalidates the Westergren E.S.R. nor necessitates correction" reminds me of my conclusion in my paper in the *Edinburgh Medical Journal* (1945), **52**, 132, where I deduced that "the blood sedimentation diagram is parallel to the degree of anaemia only in anaemias due to haemorrhage and pernicious anaemia. In other types of anaemia there is no correlation between B.S. diagram and the degree of anaemia. The corrections of the B.S. results in anaemias are meaningless."

Having carried out until to-day almost 11,000 E.S.R. tests, many hundreds with different anaemias, I am more convinced now than five years ago that cases with different degrees of anaemia may have the same E.S.R., and cases with the same degree of anaemia different E.S.R.s, so that correction of the E.S.R. in anaemias seems really to be incorrect.—I am, etc.,

Wrexham, Denbighshire. H. DLUGOSZ.

SIR,—I apologize for reviving an old controversy, but the recent article by Dr. Richard Terry (December 9, p. 1296) has raised several points which I wish to examine in the light of

my own experience. I beg leave to review this subject from a theoretical and practical standpoint to clarify my argument.

When the theory of sedimentation is examined it becomes clear that the sedimentation rate (S.R.) depends mainly on the size of the sedimenting particle. As this is determined mainly by the formation of large rouleaux or aggregates of cells it is unlikely that the size of the individual cell will be an important factor, although it may have a subsidiary influence—e.g., Bendien *et al.* (1932). The formation of aggregates of cells is in turn dependent on plasma factors, mainly on fibrinogen and globulin, but in a complicated protein balance—e.g., Gordon and Wardley (1943). This plasma protein balance has been termed "sedimentin" for convenience by Day (1939). If it is assumed that the *plasma* sedimentin concentration is the same in anaemic blood as in normal blood, the total *blood* sedimentin concentration will be increased in anaemic blood as there is more plasma (and fewer erythrocytes) in a sample of such blood. This increase in sedimentin would cause larger rouleaux and an increased S.R. Furthermore, as the percentage volume of packed cells (P.C.V.) is increased in anaemia, the sedimentin will have fewer cells to influence, and hence the effect will be correspondingly greater. It follows that the velocity of sedimentation in anaemic blood will be proportional to the speed in normal blood multiplied by $\frac{45\ (100 - \text{P.C.V.})}{55 \times \text{P.C.V.}}$, when P.C.V. is the observed percentage volume of packed cells, and 45% is the normal packed cell volume (Kellett, 1947). This calculation based on a double effect of anaemia agrees better with the correction chart of Rourke and Ernstene than the simple proportion correction of Della Vida. As aggregation is a result of surface action it would be more correct to say that the S.R. depends on the amount of sedimentin acting on the total surface of all the erythrocytes, but the above conception is sufficient to explain why the P.C.V. is a better single measure for correction than either the haemoglobin or erythrocyte count.

I have examined by the Wintrobe technique a series of bloods from cases of uncomplicated idiopathic hypochromic anaemia and pernicious anaemia. In 50% of cases of both types of anaemia I found the S.R. increased in proportion to the degree of anaemia as measured by the P.C.V., and in these cases the S.R. fell as the P.C.V. rose during recovery from the anaemia. In the other 50% of cases the S.R. was raised considerably less than might be expected from the P.C.V. determination. Hence, although I cannot agree with Dr. Terry in theory, some of my own results lend partial support to his findings. It is interesting to note that other authors who have found normal results fairly constantly in anaemia and oppose correction for anaemia have, like Dr. Terry, used a technique with citrate as an anticoagulant (Bouton, Cutler, Davis (1946), Day (1939), Reichel (1936), Smith (1938), Schuster, Sugarman, Westergren). On the other hand those who favour correction have used oxalate or heparin (Britton, Collins, *et al.* (1939), Ham and Curtis, Hynes and Whitby, Rourke and Ernstene, Wintrobe). Some workers have suggested that the greater length of the Westergren tube may avoid the anaemia error by reducing the effect caused by packing of cells on the base of the tube, or the retarding force of upward currents of displaced plasma. However, these ideas would not explain the acceleration which I would expect from the primary increased aggregation of cells in anaemia. Dr. Terry has drawn attention to the stabilizing effect of citrate in the Westergren technique, and it is possible that it is the anticoagulant which has caused the above divergence of results and views. It is interesting to note that Drs. R. J. G. Sinclair and J. J. R. Duthie in a recent article (December 2, p. 1257) obtained results in Westergren tests which suggested that anaemia was having an influence on the S.R., but that *oxalate* was used as the anticoagulant.

Dr. Terry states that in anaemic blood the concentration of citrate in the plasma is less, and that therefore its stabilizing effect should be less. This conclusion is fallacious, as the effect will depend on the mode of action of the citrate. It may be postulated that the stabilizing effect of citrate is due to some type of protective action on the surface of the red cells preventing rouleaux formation. Then, as the *amount* of citrate per *erythrocyte* is greater in anaemic blood, one would expect the greater stabilizing effect which the author found.

The occurrence (though less often) of a normal S.R. in anaemic blood tested by Wintrobe's oxalate method needs further explanation. Dr. Terry points out that plasma protein changes occur in anaemia which are not considered in correction methods. I agree with him, and believe that in chronic anaemias there is a tendency to stabilization brought about by changes in the plasma proteins, sometimes by a reduction in plasma fibrinogen. The question arises whether or not it is necessary to correct the S.R. for anaemia. In my opinion it is necessary in theory, but not necessary in routine clinical work. Against all complicated correction procedures it may be argued that correction may be unnecessary in some cases, that in others the anaemia may be part of the disease, and that the result is not clinically reliable in 100% of cases. I would therefore advocate a simple method of performing this very complex test, so that the time saved may if necessary be used for some unrelated method of assessment of toxaemia (such as the Arneth count).—I am, etc.,

Bradford. H. S. KELLETT.

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Marking Varicose Veins

SIR,—The importance of multiple ligation of varicosities, combined with ligation of the internal or external saphenous vein at the groin or knee, is well recognized. With the patient in the erect position the larger channels can often be more easily palpated than seen, and communications with the deep system can be felt as holes in the deep fascia. The usual method of marking the suitable sites for ligation, by the use of an aqueous or alcoholic solution of dye, often fails because the dye runs when the limb is painted with the skin antiseptic. I have found that methyl violet dissolved in a cellulose cement, such as "durofix," adheres firmly to the skin; it resists the usual pre-operative cleaning and occasionally has to be scraped off with the knife. A greasy skin should be wiped with ether or acetone before applying the dye.—I am, etc.,

Plymouth. EDRIC WILSON.

Myocardial Infarction after Tetraethylammonium Therapy

SIR,—I agree with Dr. D. J. Livingstone (September 23, p. 713) that it could be "thought that in these cases tetraethylammonium therapy was at least a contributory cause of the acute cardiac lesions." I do not, however, see any conclusive evidence for this supposition. To my mind the lacking evidence could have been obtained if any intense drop in blood pressure had been revealed in consequence of the injections, especially if the signs of acute myocardial infarction had developed within a couple of hours of one of these injections.

Acute myocardial infarctions following an intravenous injection are not exceedingly rare. This is well known. I remember several such cases myself. One of them stands out most vividly in my memory.

A somewhat obese man in the middle forties got an intravenous injection of tetraethyliodophenolphthalein at five in the afternoon. He was a heavy smoker, but did not reveal any signs of coronary trouble until that time. Immediately after the injection he felt "just rotten." He experienced a profuse sweating and was afraid he would faint. He had to lie down. After ten minutes he felt much better and the *x*-ray examination was performed. On driving home he suddenly felt an excruciating pain in the left side of the chest, with dyspnoea. He had to stop; the pain got unbearable, and he could not move, but after about a quarter of an hour the pain lessened and he was just able to drive home. Completely exhausted, he could hardly climb the stairs to his flat on the second floor. The pains again got stronger, and his physician had to give him a morphine injection, repeated within half an hour. I saw the patient the next morning. The temperature was 101° F. (38.3° C.), blood pressure 75/110 mm. Hg. Humid rales were heard at both bases. The blood count gave 15,600 white cells. The electrocardiographic finding was that of a left-sided infarction. The patient recovered from this incident but was never the same man again. He developed a congestive heart failure and died about three years later.

I completely agree with the author that great care should be exercised in the use of tetraethylammonium chloride in any patient showing evidence of arteriosclerosis, especially, I would add, if the drug be given intravenously. Or, rather, it should never be given intravenously in people over 40.—I am, etc.,

Sydney, Australia. CHARLES ENGEL.

Fibrillation and Flutter

SIR,—Dr. G. L. Foss (December 2, p. 1252) in his interesting account of the treatment of thyrotoxicosis with 2-mercapto-imidazole records the conversion of auricular fibrillation to flutter. This he regards as a possible toxic manifestation, not mentioned in the literature. In theory, a stage of flutter may occur in every change from fibrillation to sinus rhythm, and I have been accustomed so to regard the flutter that is sometimes seen in thyrotoxic heart disease in the course of treatment. It follows that no medication is required beyond continuation of the antithyroid drug already in use. Here is a case in point.

A man aged 49, referred to me with fibrillation that I considered to be thyrotoxic in origin, developed flutter after two weeks on methyl thiouracil. After seven days' further treatment this reverted to sinus rhythm without the use of quinidine or digitalis. Each stage was confirmed electrocardiographically. Sinus rhythm persisted during the three and a half years that I had him under subsequent observation.

I think that Dr. Foss has been unduly harsh with himself in regarding this case of flutter as toxic in origin, and that, even if not mentioned in the literature, the sequence of events that I have described has been observed a number of times.—I am, etc.,

Cheam, Surrey. C. P. PETCH.

Euthanasia

SIR,—There are a few points in your very fair and, if I may say so, sympathetic leading article (December 9, p. 1318) on which I should like to comment, and one or two small corrections to be made. I will deal with the latter first.

(1) You more than once refer to "incurable disease," which term at once raises the objection that "diseases incurable to-day may be curable to-morrow." In my Society's Bill, as introduced in the Lords in 1936, the term "incurable disease" is not once employed; we only mentioned "incurable illness," which is quite another matter. There will always be incurable illness no matter what advances are made by medical science.

(2) You refer to the nearest relatives having to be informed. It is true that in the original draft of the Bill I did bring in the "nearest relatives," but we decided, under legal advice, to leave them out entirely in the revised Bill introduced by Lord Ponsonby.

(3) You state that "euthanasia is to be administered by the medical practitioner named in the permit." This also is not quite correct. Our Bill provides (Sect. 5 (1)): "Euthanasia shall not be administered by any person other than a medical practitioner licensed for the purpose." As a matter of fact, owing to the objection continually raised that "it is a doctor's business to cure and not to kill," my Society has now decided that when our Bill next comes forward the above clause, 5 (1), shall be amended by inserting the words "or other suitable person" after "medical practitioner." Incidentally, I may mention that it was never contemplated that many, if any, doctors in general practice would care to undertake this duty, even though it would be an act of pure mercy. In these days of motor transport only a very small number of "euthanisors"—or should we call them "mercy operators"?—would be required to serve the whole country, at least for some time to come. Moreover, our Bill does not stipulate that even the "euthanasia referee" need necessarily be a doctor—he might well be a lawyer. So that under our Bill all that would be asked of the medical profession would be the two medical certificates, testifying to what were matters of fact in the doctor's opinion, and there would be no actual obligation even to provide these. Hence the argument, so often used, that what is proposed would place an intolerable burden of responsibility upon the medical profession, and would confer upon it a power which might easily be abused, is entirely due to misapprehension and has no foundation in fact.

When Lord Chorley's motion in favour of voluntary euthanasia was debated in the Lords on November 28 (*Journal*, December 9, p. 1338) all the five medical peers present spoke against it. This, of course, was very unfortunate from our point of view and scarcely gave the motion a chance, but I may perhaps recall that the first president of our Society, who but for his untimely death would have introduced our Bill himself, was the late Lord Moynihan, the eminent surgeon and a past-president of the Royal College of Surgeons; also that one of our vice-presidents was the late Sir Humphry Rolleston, a past-president of the Royal College of Physicians. To-day, some 170 distinguished members of the profession, all of "Who's Who" status, and including 30 who have been knighted, have given us permission to use their names as being in sympathy with our objects.

As regards the religious objection, it is true that the Archbishop of York spoke strongly against the motion, but I would recall that when our Bill was before the Lords in 1936 the then Archbishop of Canterbury, although he voted against the Bill, said: "I must confess that this is, to me, a very difficult question, one in which principle and compassion contend, so that I find it not at all easy to make up my mind"; and I may mention that a number of distinguished churchmen, including the Dean of St. Paul's, have given us permission to use their names as being in sympathy.

Similarly, although the Lord Chancellor spoke strongly against the motion, we have a number of distinguished lawyers who are with us, and one of our vice-presidents was, until he retired, a judge of the High Court.

In concluding your leading article you say (quoting Lord Horder): "The good doctor will distinguish between prolongation of life and the unnecessary prolongation of the act of dying." Surely the "unnecessary prolongation of the act of dying" is very nearly if not quite what my Society is contending for.

It is often asserted that we are asking for the "right to kill." May I suggest that what we are asking for is rather "the right to die" (subject to certain necessary restrictions and safeguards), and for the right of the sufferer to receive such assistance from others as may be required in the exercise of this right.—I am, etc.,

Leicester. C. KILLICK MILLARD,
Hon. Sec., Voluntary Euthanasia Legalization Society.

SIR,—It was with profound disquiet that I read your leading article (December 9, p. 1318), where a subject of such gravity as euthanasia is discussed without so much as a reference to the fundamental issue which is at stake—I refer to the moral implications.

I would recommend, therefore, lest this issue be overlooked by irrelevant controversies over such matters as bureaucratic procedure, morale of the sick-room, and diagnostic errors, that we keep constantly before our minds those words of St. Paul: "None of us lives as his own master and none of us dies as his own master. While we live, we live as the Lord's servants, when we die, we die as the Lord's servants; in life and in death we belong to the Lord" (Romans xiv. 7-8).—I am, etc.,

Croydon. F. J. MOYNIHAN.

Cost of Academic Clinical Office

SIR,—If a wealthy man likes to indulge in lavish expenditure on travel, books, societies, journals, entertainment, etc., he is of course entitled to do so. In a nutshell the gr evance of Academicus (December 2, p. 1275) appears to be that he cannot eat his cake and have it. Possibly an ingenuous and spendthrift millionaire with an income of £100,000 and an expenditure of £99,800 might convince himself that he earns less than an Asiatic labourer, but he would convince nobody else—least of all the Asiatic labourer.—I am, etc.,

London, W.8. GEOFFREY G. SHERRIFF.

A Failing Policy

SIR,—The title of your leading article in the *Journal* (December 2, p. 1262) suggests that things might have been otherwise, and in the text you attribute failure to the Minister. Does not the real failure rest on those who agreed, against the wishes of the majority, to operate a policy which was doomed to failure? Certain powerful sections of the profession "saw their way" to operate parts of the scheme, and they evidently overruled the counsels of those who perceived in the main administrative framework an insuperable obstacle to sound planning. It is more likely that the historian of the future will be more astounded at this aspect than at the Minister who may have failed subsequently to develop some particular aspects of the scheme.

The White Paper of the Coalition Government, the schemes of the British Medical and other Associations, and the Bill itself all bore the hall-marks of political or medico-political expediency. No medical administrator of experience would have

produced a scheme which arbitrarily divided a personal health service into three lopsided divisions with no effective provisions for co-ordination or balanced economy. Certainly, no one whose vision went beyond the narrow confines of politics or the more specialized branches of curative medicine would have forgotten the vital role of preventive medicine. To forget that infectious-diseases hospitals, sanatoria, and, to a considerable extent, maternity hospitals were later adnexa of preventive medicine is on a par with the naive assumption that epidemics have had their day, that tuberculosis is a "general" rather than an infectious disease, and that all that remains of preventive medicine can be reduced to such simple terms as vaccination and immunization.

Having made a case, Sir, for the readjustment of the economy of the service, including the remuneration of those engaged in it, you conclude by saying that payment, or the lack of it, has nothing to do with the present discontent and disillusionment of the profession. Surely that is illogical. Let us face facts, if ever we are to advise the Minister on how best he can spend what money the Treasury will give him. At the present time the allocation of money for health services is roughly in the ratio of 1:12:24 for local health authorities, executive councils, and hospital boards respectively. Hospital administrative costs have shown the most spectacular increases without any increase in the number of available beds. It is almost impossible to obtain an analysis of these costs, but specialists' salaries are known to be a major item, and overhead costs, due to the cumbersome and wasteful system of management by boards, have shocked all who formerly managed the same hospitals.

Having dealt with statistics for more years than I care to remember, I know their limitations, and I am going to suggest that never have there been so many men, especially young men, in receipt of full specialist remuneration. Herein lies, I think, the failure to encourage the budding specialist. Having filled up the establishment there is little chance of succession for many years to come, and it is going to be a very difficult matter to persuade those who have suddenly made the grade that they must forgo some of their remuneration in order to bridge the gap which separates them from their less successful colleagues. The position of the *established* general practitioner, as compared with the entrant to general practice, is somewhat similar. The established doctor in either branch has experienced in the main a definite improvement in his finances as a result of the Act, and we know that the same holds true for dentists and opticians. If the Treasury can spare no more money, then some of this extra remuneration must be applied to the gradual advancement of recruits. I am aware that general practitioners, dentists, etc., are working hard for their money, but I have the impression that the unexpanded hospital service is top-heavy with specialists. Advice is of little use if it cannot be applied in practice—i.e., in hospital. Even in this age of substitution free spectacles or cough mixtures count for little to the chronic sick in their lonely attics, or to the bedridden consumptive awaiting admission to a sanatorium.

Some assume that the clock could be put back where it was on July 5, 1948, but that is manifestly impossible. The vesting date for practices, as well as for hospitals, is as irrevocable as that for the mines. It would appear to be an inevitable, if ironic, conclusion that the only way in which the profession can recast the health services in some semblance of a workable and economic proposition which will improve the health of the people and will, at the same time, attract recruits is to ask the Minister to introduce full State medicine. Those who may recoil, however, from such a suggestion should reflect on just how much they have gained or lost by their insistence on retaining what is little more than a travesty of freedom. We have been saddled with boards and councils whose members in the main know little of medical administration. In order to keep them on the rails they have been issued with directive circulars and supplied with technical officers. Some boards have ignored this guidance, and their management on the whole has not been of a high order. Nevertheless they represent expenditure which could be dispensed with. In a full State service they would disappear and the Minister himself would be directly responsible to Parliament. In their place there would be a small number of higher administrative officers—call them Civil Servants if you will—but the whole service, being highly technical, would inevitably develop on the advice of its technicians. Promotion would be a gradual process determined by the quality and service of the individual. At least we would be spared the unedifying spectacle of laymen being canvassed by prospective general practitioners, of specialists meeting in secret to share out distinction awards, and of the wide anomalies existing between those doing comparable work. The whole artificial and expensive barriers between regions, areas, and branches of the service would likewise disappear, with an improvement in balance and a great saving in man-power and money. There should be sufficient funds left over to provide and staff a number of hospital beds and perhaps one or two experimental health centres. As a realist, can one seriously lay much emphasis on health centres or on the Minister's failure to provide them? Until such time as practitioners pool their patients (an undesirable step) it is unlikely that they will favour communal consulting-rooms.

Finally, I would make a plea that the profession permit those who, by experience and training, have some knowledge of how a full service can be planned to draw up a draft scheme for the future, others having tried and failed.—I am, etc.,

Kirkcaldy. JAMES R. W. HAY.

Pulmonary Complications of Pertussis

SIR,—The annotation on this subject (November 18, p. 1162) states that in an article of mine I did not confirm previous suggestions that the high incidence was related to the severity of the disease. The article referred to contains figures to show that the incidence of pulmonary collapse rises with the severity of the disease.

My series of cases is also referred to as unselected, and it is said that 21% had persistent collapse for more than a year. The series was in fact selected, as all the cases were sufficiently severe to require admission to hospital, and the figure 21% refers to severe cases only.—I am, etc.,

London, S.W.1. DAVID NICHOLSON.

POINTS FROM LETTERS

Psychiatry and the Common Cold

Dr. M. C. ANDREWS (Wembley, Middlesex) writes: Is Dr. H. M. Feldman (November 11, p. 1120) serious when he writes about the emotional cause of the common cold? When I have toothache or a pain in my stomach I suffer from "a decrease of objective feelings of normal affection and sociability, and a tendency to self-absorption, a mood of irritability, and restlessness. . . ." This does not make me think I am suffering from "a basic mental conflict involving some interpersonal relationship." I suspect I have dental caries or have eaten bad food.

Technique of Ventrosuspension

Dr. E. HESKETH ROBERTS (London, W.1) writes: Statistics in gynaecological literature of the results of ventrosuspension by round ligament procedures are insufficient for the guidance of operators; the multiplicity of methods suggests there is scope for improvement, and it has not been emphasized sufficiently that there is a disturbing percentage of sequelae. . . . I found in 1945 that iliac pains were completely avoided by anchoring the plicated or shortened round ligament to the anterior wall of the uterus (utero-teretial suspension), instead of the anterior abdominal wall. . . . But occasional recurrence of retroversion was not prevented until the technique of utero-vesical suspension was added in 1946 . . . a foreshortening of the incised and lifted utero-vesical and para-vesical peritoneum to within 1 cm. of the bladder and stitching it to the upper anterior uterine surface (and laterally beyond the plicated round ligament but in front of the Fallopian tubes, which undergo no distortion). In 1947 I came to the conclusion that this foreshortening with advancement of the peritoneum was the essential portion of the operation to prevent recurrence, but that the utero-teretial plication was probably necessary to ensure sound healing and organization of the utero-vesical peritoneal suture line. After this deduction I substituted 40-day chromic catgut No. 3 for the fascial suture used in the 1946 plication. The relief of tension by plication of the inner two-thirds of the ligamenta teretia enables the use of a continuous suture of No. 1 chromic catgut for the peritoneum, thus diminishing the risk of adhesions due to the free ends of interrupted sutures. In four years I have had no recurrence of retroversion or iliac pains; follow-up is maintained for two years, and it is hoped to give more exact figures later. . . .

Obituary

HENRY MACCORMAC, C.B.E., M.D., F.R.C.P.

With the death of Dr. H. MacCormac on December 12, at the age of 71, after a long and painful illness, dermatology is deprived of one of its most eminent exponents. For about 40 years, and with seemingly increasing energy as he grew older, he applied himself ruthlessly and in defiance of failing health to the pursuit of his ideals. That he achieved his goal not only in this country but internationally is beyond doubt. To his British honours and degrees were added honorary membership of the leading dermatological societies of America, France, Belgium, and Denmark.

[Elliott and Fry]

It was almost entirely due to his strenuous and persistent advocacy that skin diseases came to be recognized as an important cause of disablement and military wastage, and a classical contribution from his pen in the *British Journal of Dermatology and Syphilis* in 1917 on "Skin Diseases and their Treatment under War Conditions" is a lasting testimony to his efforts in that cause as well as to his skill and lucidity as an author. The C.B.E. which he was awarded in 1919 was an official recognition of the outstanding services he had rendered. During the first world war he was also awarded the Médaille d'Honneur de l'Assistance Publique for his services to the civilian population at and around Hardelôt-Plage, where, as a lieutenant-colonel in the R.A.M.C., he was in medical charge of No. 25 General Hospital for skin and gassed cases.

The son of John MacCormac, of Belfast, MacCormac graduated M.B., Ch.B. in 1903 at Edinburgh, and after coming to London soon established himself as assistant bacteriologist and medical registrar to out-patients at the Middlesex Hospital. Research work on the histology of cutaneous cancer probably accounts for his initial interest in dermatology and for his appointment as assistant in the dermatological department under Dr. J. J. Pringle, the acknowledged peer of such contemporaries as Radcliffe Crocker and Sir Malcolm Morris. To the experience gained there MacCormac added a study of the wealth of material at the St. Louis Hospital, Paris, under Professors Darier and Sabouraud. After taking the M.R.C.P. in 1909 he was appointed, on the death of his chief, physician to the skin department at the Middlesex Hospital. From that time he became prominent as a regular contributor to the literature and to the discussions and demonstrations of clinical cases at the Dermatological Section of the R.S.M. His name figures frequently in almost every volume of the *British Journal of Dermatology and Syphilis* since 1908. Not content with his clinical and teaching duties at the Middlesex Hospital and a growing private practice, he held dermatological posts at the Infants' Hospital, Vincent Square, St. John's Hospital for Skin Diseases, and the Seamen's Hospital, Greenwich, at the last institution gaining much valuable experience in the diagnosis and treatment of venereal diseases.

He became secretary of the Section of Dermatology of the R.S.M., and later president both of the Section and of the British Association of Dermatology. An honour he esteemed highly was the Lumleian Lectureship in 1945 at the Royal College of Physicians. He had been elected Councillor of the College in 1941. Among his later activities he sponsored and produced two films—on scabies and industrial dermatitis—and he was the first dermatologist to be appointed a medical referee. While he never wrote a textbook, he made himself responsible for the entire English edition of Jacobi's *Atlas of Dermochromes* (fourth edition), a work of the greatest value to students.

MacCormac—"Mac" to his many friends—never lost his inimitable Irish humour. An inexhaustible fund of topical anecdotes and a notable oratorical talent rendered him an indispensable adjunct to innumerable social and professional occasions. He was a loyal and lovable friend, and a generous supporter of many a young beginner. He held the unvarying affection and confidence of many grateful patients. He will be sorely missed by them and all his colleagues. Deepest sympathy is extended to his devoted wife, who for many years was his veritable right hand and secretary, and to a son at school.—H. C. S.

F. R. B. writes: To one whose difficult task it was to follow Dr. Henry MacCormac in some of his hospital work his death now, early in his retirement, causes profound sorrow. The details of his career will be more fully known and better recorded by his contemporaries; a younger man has perhaps had an equal opportunity of appreciating his great kindliness and generosity. Although in failing health, it was his great pride to keep on with his work, and his unspoilt, sprightly sense of humour, sometimes ironical but never unkind, gave his conversation an effervescent quality. It was difficult to believe that he could ever have been more light-hearted and youthful in outlook than he was in his seventies. Since the beginning of his illness last summer it has been obvious that it is not only among his colleagues and old pupils that "Harry Mac" will be missed, for innumerable patients have expressed their concern and sent messages of sympathy. His unfailing courtesy and kindly understanding will never be forgotten.

W. BROOKE PURDON, D.S.O., O.B.E., *M.C.*, M.B.

Major-General William Brooke Purdon, who was at one time Commandant and Director of Studies at the Royal Army Medical College, died in London on December 1, aged 68. He had been Ulster Agent in London since 1946. Brooke Purdon was born in Belfast and educated at Queen's College, where he studied medicine. He graduated M.B., B.Ch. in 1906, and joined the R.A.M.C. a year later. During the first world war he was awarded the D.S.O. and the *M.C.*, and was also mentioned in dispatches three times. In 1913 he took the D.P.H., and it was as a hygiene specialist that he became well known after the war. In 1923 he was appointed O.B.E. and an officer of the Venerable Order of the Hospital of St. John of Jerusalem. He was Assistant Director of Hygiene at the War Office from 1930 to 1934, and later became Professor of Hygiene at the Royal Army Medical College. During the second world war he was for nearly five years medical superintendent of Queen Mary's Hospital, Roehampton. From 1938 to 1941 he was honorary surgeon to the King. In 1946 he gave up his medical career to become the Agent in London of the Northern Ireland Government, and in this post he was remarkably successful. During his younger days he was a good rugby player, being capped for Ireland

several times. At the time of his death he was president of the London Irish Rugby Club.

Mr. Leon Gillis writes: We grew to know Major-General Brooke Purdon well during the war years when he was medical superintendent of Queen Mary's Hospital, Roehampton. As a doctor he served his patients to a far greater extent than if he had specialized in medicine or surgery. It is not only the physician or surgeon who can help his fellow men but it is also the good administrator. Here was a personality who was beloved by all who knew him. His cheery face and kindly expression will long be remembered at the hospital. To those of us who knew him intimately the depth of feeling that he showed for all people was something to be wondered at. He was the embodiment of kindness, and visited his patients through the most critical days of their illness with encouraging words. He was always ready to give credit where credit was due, and the discipline of the hospital was a thing to be admired. He had a host of friends throughout the world who kept up a regular correspondence with him. His fund of stories seemed endless, and the occasions were few when his extraordinary memory could not produce an appropriate narrative. He enjoyed a full life and died a man without enemies.

S. WATSON SMITH, M.D., F.R.C.P.

We announce with regret the death on December 15 of Dr. S. Watson Smith, a Past-President of the B.M.A. and a consulting physician at the Royal Victoria and West Hants Hospital, Bournemouth.

Sydney Watson Smith, a native of Dundee and son of the late Colonel W. Smith, J.P., qualified at the University of Edinburgh in 1903, proceeding M.D. in 1925. After qualifying he was house-surgeon and house-physician at the Dundee Royal Infirmary, and then continued his post-graduate studies in Edinburgh and London, eventually, in 1907, going into practice in Dundee, where he worked extremely hard. Although he had been a keen Territorial, failing health before the first world war compelled him to resign his commission. However, he succeeded in getting into the R.A.M.C., but was invalided out in June, 1918. Early in 1919 he began to practise in Bournemouth, becoming a consulting physician there in 1924. In 1925 Dr. Watson Smith took the Membership examination of the Royal College of Physicians of Edinburgh, and three years later that of the Royal College of Physicians of London. He was elected F.R.C.P.Ed. in 1930, and in 1938 the London college elected him to its Fellowship. Among the appointments he held in these years and subsequently were those of honorary consulting physician and honorary consulting dermatologist to the Royal Victoria and West Hants Hospital, and honorary consulting physician to the Royal National Sanatorium at Bournemouth. His advice was sought by colleagues over a wide area, including parts of the counties of Hampshire, Dorset, and Wiltshire. He made a detailed study of the severe typhoid epidemic at Bournemouth in 1936 and published an account of it in a booklet.

In 1934 the B.M.A. held its Annual Meeting at Bournemouth, and Dr. Watson Smith was then elected President of the Association. Those who were fortunate enough to be present at that meeting remember what an outstandingly generous host he was. In his presidential address he characteristically pleaded for a rational approach to medical climatology. Within the B.M.A. Dr. Watson Smith carried out much useful committee work, serving on the Council from 1934 to 1936 and on many of the Association's committees.

Dr. O. C. Carter writes: I had the privilege and pleasure of knowing Watson Smith intimately over a period of many years. I knew him as a consultant whose wisdom, knowledge, and advice were of inestimable help to me in the conduct of general practice, and I knew him as a friend and as a patient. During the preparation for the Annual Meeting of the B.M.A. in Bournemouth in 1934, as honorary local general secretary, I came a great deal in contact with Watson Smith as President-Elect, and during that year of preparation he spared nothing in time or energy. No one who attended the Bournemouth meeting will ever forget the magnificence of his presidential reception in the Pavilion, the cost of which was defrayed by him personally. He was the editor of the *Book of Bournemouth*, which was produced specially for the meeting and is now very hard to come by.

In 1935 he led the first world tour of the Association at the time of the Annual Meeting in Melbourne, where he installed the late Sir James Barrett as his successor in the presidential chair. Later he wrote the official chronicle of the world tour. During the time he was chairman of the local medical war committee—he was unanimously elected to this office in 1938, and he held it until illness forced him to give it up in 1944—I was its secretary, and he carried out his work with thoroughness, ability, and complete impartiality. Many have lost a great friend, a man of integrity, generous character, and great kindliness, and the profession has lost a noble colleague who was held in high esteem. He made no enemies, and no one begrudged him the great success which he made in his professional career.

Dr. FRANCIS MOLISON MILNE, consultant physician and pathologist to the Dundee Royal Infirmary, died in Dundee on October 28. He graduated M.A. with honours at St. Andrews University in 1897, and then proceeded to take the degree of B.Sc. He was interested in marine biology and was for a time assistant to Professor M'Intosh. He then turned to medicine and graduated M.B., Ch.B. in 1904. After a resident appointment at the Infirmary, he came to London as assistant to the pathologist at the London School of Clinical Medicine. In 1909 he returned to Dundee as assistant to the professor of pathology in the University of St. Andrews. In the same year he took the D.P.H. and was appointed lecturer in clinical pathology in the university, a post which he held until 1933, when he became a lecturer in clinical medicine. From 1919 to 1933 he was also physician for diseases of the skin at Dundee Royal Infirmary and in 1933 was appointed a visiting physician. He retired in 1938. Frank Milne was the possessor of a phenomenal memory. He was an interesting and inspiring teacher, seen at his best in impromptu clinical teaching, and many of his students, who will have learned of his death with deep regret, realize to the full the debt they owe to him for the clinical knowledge they acquired under his enthusiastic guidance in the medical out-patient department. Temperamental, yet one of the kindliest of men, his many quiet acts of practical kindness are cherished memories to very many of his colleagues and patients alike. Intensely interested in his fellow-men, he had innumerable friends and acquaintances in all parts of Scotland and in all walks of life. He had a fine knowledge of pictures and of books, and for 22 years had been a householders' representative on the Dundee Public Libraries Committee. He will be mourned by very many, both of the Town and of the Gown.—G. R. T.

W. F. D. writes: I pay tribute to Frank Milne after 35 years of his friendship—as teacher, senior colleague in forensic work, family physician, and finally beloved patient. Gifted with an encyclopaedic mind, knowledgeable beyond most in many diverse interests, his very diversity prevented him from becoming a genius. As a teacher he was ahead of his time—urging us students to do clinical pathology and post-mortem work not

in the curriculum, and encouraging us to seek ward work in the Poor-Law hospital while its doors were still officially closed to students. In medico-legal work his help was invaluable; at necropsies, in framing reports, and in preparing evidence for the courts he had a knowledge of legal points and a balanced sense of fairness which made him an ideal adviser and critic. With apparently no spare time, he yet could give hints on gardening, nature study, bee-keeping, and holiday touring which always proved useful and practical. Soon after he retired war came. As his contribution to war work he took over the duties of skin specialist at Aberdeen. Travelling to and from that city proved arduous, and the trials of an early air raid precipitated a seizure. Crippled in body, his mind was unharmed, and with dauntless courage he continued to play his part as citizen and friend till a few weeks before his death. Many in Dundee besides his colleagues and patients loved and honoured the man and mourn his passing.

GEORGE HUGH CULVERWELL, Chief Home Office Inspector under the Cruelty to Animals Act, died on December 9, at the age of 63. His parents lived in Co. Down, and after leaving school he studied medicine at Trinity College, Dublin, where he was Stewart Medical Scholar in Natural Science. Among other academic distinctions he won the Purser Medal in physiology and the Dublin University Biological Association Medal. He graduated M.B., B.Chir. in 1913 and proceeded M.D. a year later. He took the D.P.H. in 1914. After serving in the R.A.M.C. during the 1914–18 war Culverwell spent a short period as school medical officer for Berkshire County Council. From there he went to the Home Office as a medical inspector in the reformatory and industrial schools department. His main preoccupation in this position was with the diet of the children. There was at that time an alarmingly high tuberculosis rate among them, and Culverwell tackled the problem from the public health standpoint. As a result of his work the diet of the boys and girls in these schools was greatly improved, particularly their milk allowance, and not only did the tuberculosis rate go down but the rate of growth of the children increased quite significantly. This achievement was assisted by the departmental sympathy which he mobilized, but it was nevertheless a remarkable one, and set a new standard for the care of deprived and delinquent children. For his work in the Children's Branch at the Home Office Culverwell was appointed O.B.E. In 1936 he transferred to that branch of the Home Office which administers the Cruelty to Animals Act of 1876 (experiments on living animals). Here for ten years he served as inspector. This period included the difficult war years, when his place of work was moved on a number of occasions, and the travelling he had to do was made more arduous by the circumstances of the war. In 1946 Culverwell became chief inspector, and remained in this position until his final illness.

W. L.-P. writes: In many ways Culverwell was one of the old school of administrators—unhurried, just and conscientious, and with an utterly inflexible standard of integrity and fair dealing. He would take infinite pains to explain to those who wanted to know the intricacies of the Act he was called upon to administer, and also to understand and solve the problems facing licensees under the Act. In all things he took the long view, for he was a man of clear vision, and would never commit himself to an opinion, or an action, until he was satisfied that it was correct and practicable both immediately and remotely. He never spared himself, for it was not his nature to give only half his energies to his work. Had he been differently constituted he might have been able to ease up in recent years, but as it was he was fully engaged right up to his last brief illness. His personal charm and courtesy endeared him to many, particularly to his more intimate friends, and those of his colleagues who had worked closely with him realize what a great loss his death brings. He was always ready with help and advice, and it was always good advice that he gave. If any man earned a quiet retirement it was Culverwell, but his own exacting nature and his sense of duty denied him this reward. He leaves a widow, a daughter, and a son.

Medico-Legal

ALLEGED 360-DAY PREGNANCY

The House of Lords by a majority (Lord Oaksey dissenting) on December 14 allowed the appeal of the husband who brought a divorce suit on the grounds that a baby born 360 days after the possible date of conception was not his.

On August 13, 1946, the wife gave birth to a child which weighed 8¼ lb. and was apparently normal in every way. The husband contended that he had been serving in Germany with the R.A.F. between August 17, 1945, and February 9, 1946, and that the child had been conceived in October or November, 1945, when he had no access to his wife. Judge Burgis, sitting as a Divorce Commissioner, first heard the petition and dismissed it, and the Court of Appeal ordered a rehearing. This took place before Mr. Commissioner Blanco White on March 24, 1949.[1]

Mr. Commissioner Blanco White said he was satisfied on the medical evidence that the child could not have been conceived as late as 186 days before the birth. Gestation periods of 346 days in 1947 and 349 days in 1948 had previously been accepted, and in this case the Commissioner, on the court's judicial knowledge of natural laws, could not say that 360 days was an impossible period, and he was not satisfied beyond reasonable doubt that adultery had been committed.

On July 22, 1949, the Court of Appeal by a majority (Lord Justice Denning dissenting) directed a new trial and gave leave to both sides to appeal to the House of Lords.[2] Lord Justice Denning then said that he would have been for allowing the appeal and granting a decree nisi.

In his judgment in the House of Lords Lord Simonds said[3] that the question that had then presented itself to the Commissioner was whether the fact that at least 360 days had elapsed between the last possible intercourse between husband and wife and the birth of the child, together with the medical evidence, put it beyond reasonable doubt that the child was not the child of the husband. The Commissioner had answered that question in the negative. Lord Simonds thought it clear that the Commissioner did not consider he would be justified in finding that adultery had been committed merely on the ground of lapse of time without medical evidence, and he found that the medical evidence adduced was unsatisfactory.

The appeals raised a question of peculiar difficulty which might be stated in this way: If a husband proves that his wife has given birth to a normal child 360 days after he could have had intercourse with her, and no proof of any adulterous intercourse by her is given, what, if any, further evidence is required that the child is not his child?

The utmost that a court of law could demand was that it should be established beyond all reasonable doubt that a child conceived so many days after a particular coitus could not be the result of that coitus. The court had judicial knowledge of the normal period of human gestation, but could the court altogether, and, if not altogether, within what limits, disregard the abnormal? Could the court find as a fact that adultery had been committed if the period of gestation had been abnormal and no evidence to explain it had been adduced? He thought it would appear fantastic to any ordinary man or woman that a normal child born 360 days after the last intercourse of a man and a woman was the child of that man, but the difficulty lay in drawing the line.

After referring to other long periods of gestation that had been accepted he said he must come to the conclusion that an additional period of 11 days, making 360 days in all, ought not to be regarded as making the vital difference so that the court could, without any further evidence, regard adulterous intercourse as proved beyond all reasonable doubt. In the present case the only medical evidence was that of one doctor.

[1] *British Medical Journal*, 1949, **2**, 181.
[2] Ibid., 1949, **2**, 337.
[3] *The Times*, December 15, 1950.

Lord Simonds said he had no hesitation in accepting that evidence as adequate to justify a finding that beyond all reasonable doubt the child was not the child of the husband. The doctor had not claimed to have studied the problem of the "maximum period from the time of sexual intercourse to the time of the impregnation of the ovum." But, said Lord Simonds, it was sufficiently clear from his answers that, while recognizing the possibility of some interval between coitus and fertilization, he regarded as impossible an interval which would defer the birth of a normal child to 360 days after coitus. Lord Simonds thought the doctor was entitled to say that as a matter of competent medical opinion without having made a special study of the subject. The Commissioner had not been justified in disregarding his evidence but should have made a decree for divorce.

The appeal of the husband was allowed, the cross-appeal of the wife dismissed, and the cause remitted to the High Court in order that a proper decree might be made.

Lord Oaksey said he was in favour of dismissing the petition and allowing the cross-appeal.

Universities and Colleges

UNIVERSITY OF LONDON

The following candidates have been approved at the examinations indicated:

POSTGRADUATE DIPLOMA IN PSYCHOLOGICAL MEDICINE.—J. A. Ardis, Laura M. Barlow, A. S. Clark, Ruth A. Cohen, R. B. Davis, J. R. E. Dobson, O. Elgarem, A. Elithorn, W. Fabisch, L. Ford, G. J. Goldberg, J. T. Hutchinson, W. A. MacIlrath, H. E. S. Marshall, J. K. W. Morrice, B. J. Phillips, R. M. Phillips, H. Pozner, A. A. Robin, E. Rosenthal, T. Schlicht, R. D. Scott, D. B. Stone, D. L. C. Thomas, W. L. Tonge, J. Towers, W. H. Trethowan, H. de B. Warren, C. H. A. Wedeles, A. C. Woodmansey, T. A. Wylie. (All with Mental Diseases (Psychiatry) in Part B.) The following candidates passed in Part A only: D. Anton-Stephens, P. G. Aungle, E. D. Barlow, F. B. E. Charatan, M. B. Contractor, W. A. Cramond, H. W. D. Davies, H. Duschinsky, Herta Graz, S.-E. Hamid, A. G. Hucker, M. A. Jackson, W. G. Joffe, J. C. Kerridge, C. S. Lindsay, C. Milne, D. W. Moynagh, J. Pullicino, E. Roderic-Evans, S. Smith, G. F. Spaul, S. J. G. Spencer, B. Steinberg, H. P. Tarnesby, G. I. Tewfik, Letitia E. Woodvine, D. M. Zausmer.

The following have been appointed, or nominated for appointment or reappointment, as representatives of the University on the governing bodies indicated in parentheses: Professor E. T. C. Spooner, M.D. (St. Thomas's Hospital Medical School); Professor L. P. Garrod, M.D., F.R.C.P. (Kentish Educational Foundation, St. Albans); N. A. Thorne, M.D. (Mandeville Street and Upton House).

The following have been recognized as teachers of the University in the subjects indicated in parentheses: *Westminster Medical School:* Mr. A. Lawrence Abel, Mr. S. O. Aylett, and Mr. David Levi (Surgery); Mr. A. B. Evans (Obstetrics and Gynaecology); Dr. Ronald Jarman (Anaesthetics); Dr. J. L. Lovibond (Medicine). *Royal Free Hospital School of Medicine:* Miss A. Josephine M. T. Barnes (Obstetrics and Gynaecology); Dr. Helen E. Dimsdale (Medicine); Mr. H. D. Johnson (Surgery). *National Institute for Medical Research:* Dr. W. S. Feldberg, F.R.S. (Physiology and Pharmacology). *King's College Hospital Medical School:* Mr. A. J. Heriot (Surgery). *Middlesex Hospital Medical School:* Dr. F. D. Howitt (Physical Medicine). *St. Mary's Hospital Medical School:* Dr. J. W. Litchfield (Medicine); Dr. E. Neumark (Pathology). *St. George's Hospital Medical School:* Sir William Paul Mallinson, B.M., M.R.C.P. (Mental Diseases). Mr. H. R. Wolfe has been granted probationary recognition as a teacher of surgery at University College Hospital Medical School for two years from October, 1950.

The following, who are already recognized teachers at undergraduate medical schools, have been recognized also as teachers at the institutes of the British Postgraduate Medical Federation indicated and in the subjects shown in parentheses: *Institute of Obstetrics and Gynaecology:* Mr. D. H. Macleod and Mr. W. N. Searle (Obstetrics and Gynaecology). *Institute of Ophthalmology:* Mr. A. G. Cross, Mr. E. F. King, and Mr. J. G. Milner (Ophthalmology).

The Leavesden Hospital, Abbots Langley, Watford, Herts, and the St. Pancras Hospital Mental Observation Unit (University College Hospital Group) have been added to the list of recognized institutions at which students may take the course on mental diseases for the M.B., B.S. degrees.

UNIVERSITY OF BIRMINGHAM

The new hostel for students in residence at Dudley Road Hospital, Birmingham, during their training in obstetrics came into use on December 1. The Council and the regional hospital board have agreed that the building shall be called the Hilda Lloyd Hostel in recognition of Professor Lloyd's distinguished work as professor of obstetrics and gynaecology and of the time and energy which she has given to the scheme.

The following lectures have been arranged to be delivered at Edgbaston: January 15, 1.45 p.m., Professor K. Mather, D.Sc., F.R.S., Professor of Genetics in the University, "Genetics and Human Affairs"; March 1, 1.45 p.m., Professor J. F. D. Shrewsbury, Professor of Bacteriology in the University, "Henry VIII: A Medical Study"; March 9, 1.45 p.m., Professor Shrewsbury, "St. Anthony's Fire."

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

At a meeting of the Faculty held on December 4, with the President, Mr. Walter W. Galbraith, in the chair, the following were admitted Fellows of Faculty *qua* Physician: J. O'D. Alexander, T. Chelvarajah, J. S. Creighton, A. S. Douglas, R. M. Kapadia, Joan B. Landsman, S. A. Mannan, G. C. Provan, W. G. Whyte.

Medical News

Unique Medical Library

One of the world's finest private collections of books on medical history, the library of Dr. Erik Waller, of Stockholm, has recently been placed at the disposal of the library of Upsala University, and will shortly be transferred there as a separate unit. The collection, which comprises over 20,000 volumes and about 5,000 dissertations, contains 150 incunabula and has long been internationally famous. Dr. Waller, who recently celebrated his 75th birthday, started his collection 40 years ago, his principal interest being in old manuscripts, of which there are over 50 dating from the thirteenth century. Later he turned his attention to building up a representative collection of works by the great masters of surgery and medicine. Among the many valuable volumes is one of the very few known copies of Andreas Vesalius's *Tabulae Anatomicae Sex*, published in 1538; several rare books by William Harvey, discoverer of blood circulation; and a complete set of works by and about the father of surgery, Ambroise Paré. Dr. Waller's library also contains the first medical book printed in Sweden (on pestilence), written by Lemnius, physician to King Erik XIV in the sixteenth century, and a valuable collection of the works of Linné (Linnaeus), including his doctoral thesis.

"Oesophageal Speech after Laryngectomy"

A 10-minute talking film has been made by Campbell Harper Films Ltd., Edinburgh, for the C.O.I. and the Department of Health for Scotland, to show to patients about to undergo laryngectomy, and to medical students and medical staffs, what a man without a larynx can do to talk aloud by means of controlled belching. The film was shot in Glasgow, mostly at the special club run by Mr. T. O. Howie, Surgeon to the Ear, Nose and Throat Department of the Victoria Infirmary. Patients after laryngectomy learn to speak again and lead completely normal lives, working amid the noise of an engineering shop, speaking on the telephone, dictating letters, and so on. The club, which is unique in Britain, enables the new patient to gain hope and confidence and lose his shyness when surrounded by others who have successfully learned to talk again. This rehabilitation could only have been adequately recorded by a talking motion picture, and an excellent film has been made of it at a very low cost (£750). The idea might well be extended to other disabilities.

R.A.F. Institute of Pathology and Tropical Medicine

To mark the twenty-fifth anniversary of the founding of the Institute the Director-General of the R.A.F. Medical Service (Air Marshal Sir Philip C. Livingston) and the Senior Consultant in Pathology (Air Vice-Marshal T. C. St. C. Morton) held a reception and lunch at Halton, Bucks, on December 12. Air Marshal Sir Harold Whittingham, wartime Director-General, spoke at the lunch, and demonstrations of the work of the Institute were on view.

Penicillin Spoils Cheese-making

Cows given penicillin as treatment for udder inflammations discharge enough of the antibiotic in their milk to kill the bacteria essential for normal cheese-making. This is still so when the milk from a cow under treatment is mixed with the milk of 200 normal cows, and consequently is a serious threat to the cheese industry. In Sweden, according to the Swedish International Press Bureau, steps are now being taken jointly by the dairymen and the Veterinary Board to ensure that penicillin is used only when really necessary, and that the milk from treated cows is kept separate.

Film Censorship

According to *The Times* the British Board of Film Censors will introduce a new category in the New Year. The X certificate will be applied to films wholly adult in theme or treatment, and no one under 16 will be admitted to them. It replaces the old H certificate, which was given only to horrific films, and follows the recommendation of the Departmental Committee on Children and the Cinema (see *British Medical Journal*, July 8, p. 96).

Wills

Dr. Waldemar Shipley West, late consulting physician, the Royal Bucks Hospital, left £8,524; Dr. Horace Potts, who practised in Great Yarmouth for 50 years, left £4,519; Dr. Harold Warburton Lewis, left £11,876; Dr. Angus Duncan Macpherson, assistant medical secretary of the British Medical Association from 1904 to 1935, left £50; Dr. Andrew Stewart Wilson, late resident physician and resident surgeon (ophthalmic), Aberdeen Royal Infirmary, left £25,865; Dr. Wyndham Anstruther Milligan, for 50 years practising in Mayfair, left personal estate in England and Scotland valued at £48,506. Dr. Ivor Isaac Price, senior consultant surgeon to the Whittington Hospital, London, N.19, and late senior resident surgeon and deputy medical superintendent at St. Mary (Islington) Hospital, left estate, "so far as at present can be ascertained," valued at £7,909.

COMING EVENTS

International Congress of Military Medicine

The 13th International Congress of Military Medicine and Pharmacy will be held at Paris in 1951 (June 17–23) and is open to all doctors, pharmacists, dentists, veterinary surgeons, and administrative officers on the active or reserve lists of all armed forces. The scientific meetings will be taken under the following heads: principles of tactical organization for first aid for large numbers of wounded; organization of training and provision of a career in military medicine; medical problems raised by aerial and submarine navigation; medical aspects of defence against atomic, biological, and chemical warfare; the role of the military pharmacist. Additional papers may be read if they are submitted before April 1, 1951. Full information can be obtained from the Secretariat-General of the Congress, Section Technique du Service de Santé, 8 bis, Rue des Récollets, Paris 10e.

Paris Course on Rheumatism

A course open to foreign as well as French doctors will be held from January 29 to February 4 under the direction of Professor M. F. Coste, of the Hôpital Cochin. Clinical demonstrations, laboratory technique, and lectures on recent advances are planned. Full information may be obtained from Dr. P. Galmiche, Hôpital Cochin, 27, Rue du Faubourg St. Jacques, Paris 14e.

Twenty-sixth Annual Congress of Anaesthetists

The twenty-sixth Annual Congress of Anaesthetists, sponsored by the International Anesthesia Research Society, will be held in London from September 3 to 7, 1951. Short papers will be read in the mornings and there will be demonstrations at various London hospitals. Scientific discussions and business meetings will be held in the afternoons. There will be an exhibition of apparatus and drugs, and facilities for scientific exhibits by anaesthetists. Anaesthetists who wish to attend are requested to write as soon as possible to a member of the London Committee stating whether they wish to read a paper, and, if so, its probable length. Manufacturers should address their inquiries to Mr. A. Charles King. The following are the members of the London Committee: Dr. R. W. Cope, Dr. Vernon Hall, Dr. Ronald Jarman, Mr. A. Charles King, Dr. C. B. Lewis, Dr. G. S. W. Organe, Dr. C. F. Scurr, and Dr. W. D. Wylie. Papers should be submitted before March 15, 1951, to Dr. R. W. Cope, University College Hospital, London, W.C.1.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

McLaren.—On December 7, 1950, at Westbay Nursing Home, Broughty Ferry, Dundee, to Patricia Annette (formerly Taylor), wife of Mr. William J. McLaren, F.R.C.S., a son.

DEATHS

Babington.—On December 10, 1950, at Margate General Hospital, James William Herbert Babington, M.D., Major, I.M.S., Ret., of 24, Devonshire Gardens, Margate.

Culverwell.—On December 9, 1950, George Hugh Culverwell, O.B.E., M.D., D.P.H., of Salthouse, Thornlaw Road, West Norwood, London, S.E.

Davies.—On December 5, 1950, at Stroud General Hospital, Albert Barnes Davies, M.R.C.S., L.R.C.P., aged 89.

Dempsey.—On November 25, 1950, Timothy Gerard Dempsey, M.B., B.Ch., of 28, Marvels Lane, London, S.E., late of Dublin.

Emerson.—On December 2, 1950, at Pershore House, Pershore, Herbert Bree Emerson, M.R.C.S., L.R.C.P., aged 82.

Fisher.—On December 6, 1950, at her home, St. Kitts, Uxbridge Common, Middlesex, Emma Christiana Rolfe Fisher, L.R.C.P.&S.Ed., L.R.F.P.S.Glas.

Forrest.—On December 7, 1950, at Delgany, Maple Road, Harpenden, Herts, James Aquilon Forrest, M.B., C.M., Surgeon Captain, R.N., retired, aged 79.

Frew.—On December 1, 1950, John Frew, M.B., Ch.B., D.P.H., of 103, Howard's Lane, Putney, London, S.W.

Galloway.—On December 9, 1950, at Hill Cot, Salcombe Hill, Sidmouth, Andrew Fleming Galloway, M.D., late of 11, Finsbury Square and Clarence Gate Gardens, London.

Graham-Yooll.—On December 11, 1950, at the Royal Infirmary, Edinburgh, Ralph William Graham-Yooll, M.B., Ch.B., of Cairnton, West Linton.

Kelly.—On November 28, 1950, at Douglas, Isle of Man, Thomas Kelly, L.R.C.P.&S.I.&L.M., 1, Salisbury Terrace, Douglas.

Kyffin.—On December 13, 1950, John Kyffin, M.R.C.S., L.R.C.P., of Windfall Cottage, Brookside, Oxford, formerly of Penrhyn, Gosport, aged 84.

Logie.—On December 6, 1950, at 90, Graham's Road, Falkirk, William Jamieson Logie, M.B., Ch.B.

Lyle.—On December 2, 1950, John Beattie Lyle, M.D., of Broxbourne, Barnsley Road, Wakefield, Yorks, aged 68.

MacKay.—On November 30, 1950, suddenly, in hospital, George Ross MacKay, M.B., Ch.B., of 20, Upper Tooting Park, London, S.W., aged 49.

Martyn.—On December 5, 1950, at 33, Berry Drive, Paignton, Gilbert John King Martyn, M.D., D.P.H., late of Bath, aged 81.

Muir.—On December 9, 1950, at White Cottage, Marley, Exmouth, John Muir, O.B.E., M.B., Ch.B., beloved husband of Dr. Jessie S. Muir (formerly McEwen).

Taylor.—On December 3, 1950, at Sunbury-on-Thames, Alexander John Reid Taylor, M.B., Ch.B.

Willmore.—On December 8, 1950, at the Westminster Hospital, James Graham Willmore, O.B.E., M.D., M.R.C.P., of Edgehill Farm, Petworth, Sussex.

EPIDEMIOLOGICAL NOTES

Poliomyelitis

Notifications in the week ended December 9 were: paralytic 73 (90); non-paralytic, 31 (38); total, 104 (128). The figures for the previous week, compared with which there was a total decrease of 24, are in parentheses.

Uncorrected notifications for the corresponding week in 1947 and 1949 totalled 76 and 134 respectively. Total uncorrected notifications for 1950 to and including the week under review are 8,483. The corresponding figures for 1947, 1948, and 1949 are 9,003, 2,308, and 6,617 respectively.

County areas with the most numerous notifications in the week under consideration were: Lancs 9, Warwick 9, Middlesex 7, Kent 6, Somerset 6, London 5, Surrey 5. Nineteen county areas in England notified no cases. The only notifications in Wales were Caernarvon 1 and Glamorgan 1. The decrease in incidence of the disease in England and Wales is well maintained.

Measles

The biennial peak in the notifications of measles is due to occur in the early months of next year. Already the complaint has reached epidemic proportions. During the past two months the number of cases has increased at the rate of 1,000 a week. For the week ending December 2 there were 12,323 notifications. This is a steeper increase than that which occurred in the last epidemic period, but is offset by the fact that in 1948 the build-up, in the country as a whole, during the late summer and autumn was more substantial.

The incidence of summer cases this year was most marked in the Potteries and the north-east, but these districts have been relatively free in recent weeks. The majority of cases are now occurring in the counties around London, in Lancashire, and in Yorkshire (East and West Ridings). Of the county boroughs, Kingston-upon-Hull has been affected considerably more than any other. In November almost 3,000 cases were notified from this source. By contrast, the comparable figure for Newcastle-upon-Tyne was 15. The infection is reported to be of a comparatively mild form.

Dysentery

One of the chief features of the returns for infectious diseases during this year has been the large number of notifications of dysentery. During the week 856 cases were notified. This total exceeded the record high level of the preceding week by 230. Many of the large outbreaks have persisted over several weeks and have proved difficult to control. In practically all the outbreaks the Sonne type of organism has been responsible for the infection. The largest current outbreak is in Leicester C.B. Sporadic cases had been notified in this city up to the 31st week of this year, when the notifications rose from 2 to 22. In the following 18 weeks 651 cases were notified. Other notable outbreaks in the earlier part of the year included those at Yorkshire West Riding, where the notifications during the 7th to 14th week ranged from 110 to 205. The principal centres of infection during this period were Sheffield C.B., Leeds C.B., Bradford C.B., where 572, 252, and 134 cases, respectively, were notified during the eight weeks. Over 100 notifications a week were also reported in this county during the 18th–21st weeks. The largest returns during this four-week period were Sheffield C.B. 127 and Bradford C.B. 164. In the 12th and 13th week the notifications in Durham exceeded the 100 mark due to outbreaks in Blaydon U.D. and Stanley U.D. During the week ending June 3, 180 cases were notified in Lancashire, of which Oldham C.B. contributed 78.

During the week ending December 2 the largest returns were: Lancashire 171 (Southport C.B. 42, Irlam U.D. 33, Oldham C.B. 15, Manchester C.B. 13, Liverpool C.B. 13, Bootle C.B. 9); Leicestershire 131 (Leicester C.B. 112); Yorkshire West Riding 93 (Saddleworth U.D. 23, Sheffield C.B. 21, Brighouse M.B. 12, Shipley U.D. 12); Durham 49 (Gateshead C.B. 13, Darlington C.B. 10, Stanley U.D. 10); Monmouthshire 46 (Newport C.B. 25, Abercarn U.D. 11, Risca U.D. 9); Shropshire 43 (Market Drayton U.D. 27, Drayton R.D. 9); Northumberland 26 (Newcastle-upon-Tyne C.B. 13, Rothbury R.D. 13); London 24; Cumberland 21 (Penrith U.D. 13); Surrey 20 (Esher U.D. 9); Essex 19 (Romford M.B. 10); Glamorganshire 16 (Cardiff C.B. 12); Kent 13 (Canterbury C.B. 9); Northamptonshire 12 (Kettering M.B. 12); Warwickshire 12 (Birmingham C.B. 10); Carmarthenshire 12.

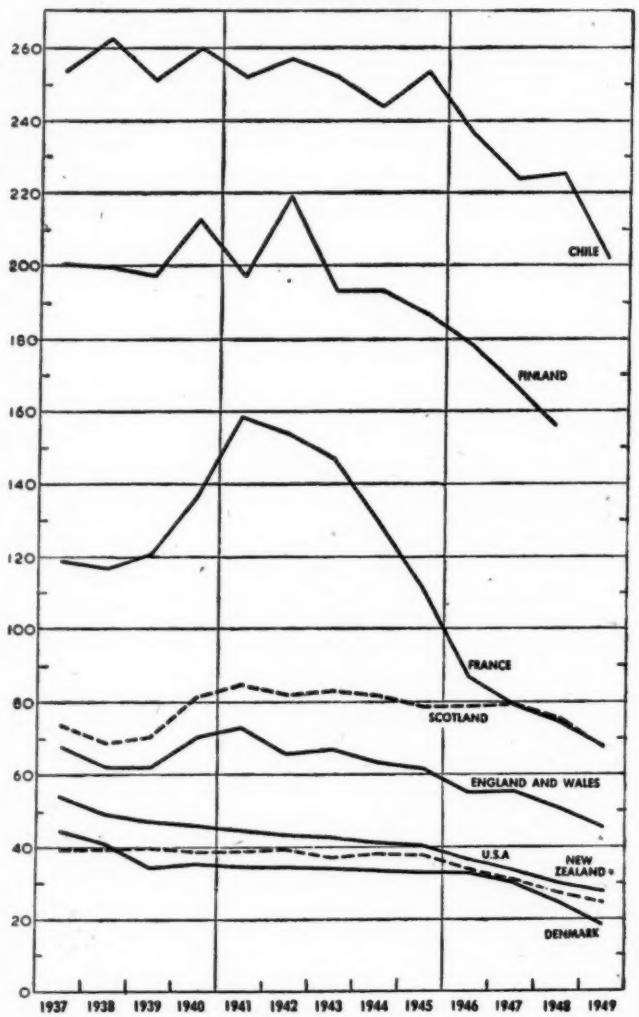
Infectious Diseases

A further rise was reported during the week in the trends of measles and whooping-cough. The notifications of measles in England and Wales are now five times the number recorded in mid-September. The increase in the incidence of whooping-cough has not been so spectacular, because this disease has been running at a high level for several months, but it is now at the highest peak ever recorded. The incidence of dysentery in Scotland remained high; 73 of the 147 cases were notified in Glasgow. In England and Wales the notifications were the largest ever recorded, the largest centre of infection being Leicester C.B. 112. The other features of note in the returns were a small increase in primary acute pneumonia in Scotland and a small outbreak—5 cases—of paratyphoid fever in the burgh of Motherwell and Wishaw.

Mortality from Tuberculosis

The graph below shows deaths from tuberculosis per 100,000 inhabitants in certain countries from 1937 to 1949. It is reproduced from the *Epidemiological and Vital Statistics Report* (October, 1950) of the World Health Organization.

Mortality from Tuberculosis in Certain Countries, 1937–49: Rates per 100,000 Inhabitants



An article by Dr. J. B. McDougall, head of the tuberculosis section of W.H.O., discusses tuberculosis mortality in various countries for which "reasonably reliable" statistics are available. He says of England and Wales, "The most remarkable fact is that in view of the wartime experience the rates for the war years were not higher." He considers that our system of rationing of essential commodities, particularly food, "had much to do with the stemming of tuberculosis mortality during these critical years."

The steeply falling rates in France since 1943 are difficult to account for, and apparently French authorities are not unanimous about the cause. The most important single factor is thought to be the rise in the general standard of living. Dr. McDougall comments that Denmark "remains unique in its position concerning tuberculosis mortality." Fatal primary tuberculosis in young children especially is almost eradicated.

Week Ending December 9

The notifications of infectious diseases in England and Wales, during the week, included: scarlet fever 1,264, whooping-cough 4,431, diphtheria 49, measles 14,076, acute pneumonia 573, acute poliomyelitis 104, dysentery 933, paratyphoid fever 2, typhoid fever 6.

No. 48

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended December 2.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included) (b) London (administrative county) (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each Infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1950 (a)	1950 (b)	1950 (c)	1950 (d)	1950 (e)	1949 (Corresponding Week) (a)	1949 (b)	1949 (c)	1949 (d)	1949 (e)
Meningococcal infection	32	4	11	1	—	26	6	14	—	—
Deaths		1	1				1	—		
Diphtheria	45	6	13	4	4	90	11	29	6	6
Deaths	—	—	—	—	—	—	—	—	—	—
Dysentery	856	24	147		4	159	10	94	—	—
Deaths		—			—				—	—
Encephalitis, acute	—	—	—		2	—	—	—	—	—
Deaths		—		—			—			
Erysipelas			26	10	1			35	10	5
Deaths							—			
Infective enteritis or diarrhoea under 2 years				31	12				28	
Deaths	21		2	5	—	18	2	4	3	2
Measles*	12,323	1210	241	136	126	1,654	31	23	92	116
Deaths†		—	—	—	—			—	—	—
Ophthalmia neonatorum	33	4	11		—	38	1	5	1	—
Deaths										
Paratyphoid fever	8	—	5(B)		—	7	—	—	—	—
Deaths	—		—		—	—	—	—	—	—
Pneumonia, influenzal	497	28	4		11	715	42	7	4	6
Deaths (from influenza)‡	28	5	2	—	—	33	5	1	1	—
Pneumonia, primary			254	¶				350	28	
Deaths	198	28		6	13	274	58		11	5
Poliomyelitis, acute	128	3	7	2	1	156	16	7	2	3
Deaths§	5	—		—		6	1			
Puerperal fever			6				—	10		
Deaths										
Puerperal pyrexia‖	94	7	3	1	—	70	11	3	—	—
Deaths							—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,434	93	233	108	40	2,755	183	284	157	274
Deaths†		—	—	1	—			—	—	—
Smallpox	—	—	—		—	—	—	—	—	—
Deaths					—				—	—
Typhoid fever	1	—	—	2	1	9	—	1	11	—
Deaths	—	—	—		—	1	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths					—				—	—
Whooping-cough	4,458	417	637	53	25	981	36	82	44	45
Deaths	6	—	1	—	—	2	—	—	—	—
Deaths (0–1 year)	210	29	26	21	11	251	37	51	46	4
Deaths (excluding stillbirths)	5,635	851	773	205	154	5,481	893	632	185	133
Annual death rate (per 1,000 persons living)			15·5					12·7	11·5	
Live births	6,664	1061	750	361	198	6,841	1067	835	264	197
Annual rate per 1,000 persons living			15·1					16·7	16·4	
Stillbirths	190	16	25			169	22	21		
Rate per 1,000 total births (including stillborn)			32					25		

* Measles is not notifiable in Scotland, and the returns are therefore an approximation only.

† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.

‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.

‖ Includes puerperal fever for England and Wales and Eire.

¶ Primary pneumonia no longer notifiable in Eire.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Glandular Fever

Q.—*Is there any specific treatment for glandular fever? If not, how should a case be treated?*

A.—There is no specific treatment for glandular fever. Recovery is invariable and there are no sequelae. The only value of a drug would be to cut short an attack, and there is no evidence that any therapy has this effect, although it has been claimed for innumerable methods of treatment.

Sulphonamides should not be given, as the bone marrow is in a sensitive state and a catastrophe may follow.

When the tonsils are severely affected with membrane formation, as in the anginose form, penicillin is of undoubted value, but not in other clinical forms. In ordinary cases with much enlargement of the cervical glands it is customary to cover the neck with cotton-wool. Otherwise treatment is purely symptomatic.

Rheumatoid Arthritis and Cortisone

Q.—*A patient, aged 64, with very severe long-standing rheumatoid arthritis, tells me that she has friends in America who would send her a supply of cortisone. Is it advisable to administer this drug in general practice? If so, what is the dosage, etc.?*

A.—In a long-standing case of rheumatoid arthritis neither cortisone nor A.C.T.H. (adrenocorticotrophic hormone) will repair existing damage. They act as a protection against the disease but are not in themselves a cure.

Cortisone should not yet be used in general practice. Experimental work is now being done to discover the best regime of treatment. It is particularly important to avoid overdosage and to determine the minimal amount for maintenance therapy. At this early stage in the use of cortisone laboratory control is necessary.

Backache in Bed

Q.—*What is the cause of pain in the lumbar region developing during recumbency in bed, the pain ceasing soon after rising and remaining in abeyance during the day, only to recur during the night? The pain is not uncommonly found in young adults in whom there is no reason to suspect arthritic changes in the spine. What are the cause and significance of this paradoxical symptom?*

A.—The commonest cause of a backache which develops during recumbency is an unsuitable bed—namely, one with a mattress which sags in the middle. Such a bed almost invariably aggravates backache, whatever its cause. The likely sites of pain are the interspinous ligaments and the capsule or other structures surrounding the zygapophysial and sacro-iliac joints. Pain is due to distortion of these structures resulting from the abnormal posture in lying. Symptoms are less likely to arise from muscle, for as a rule muscular pain comes on with exertion and is relieved by rest.

In a young adult complaining of backache, the diagnosis of ankylosing spondylitis should be considered, and, if necessary, the sacro-iliac joints should be *x*-rayed. Ankylosing spondylitis often starts with pain felt after a night in bed; it is usually months and sometimes years before the physical signs of joint disease are clinically manifest.

Keeping Vaccine Lymph

Q.—*How long will vaccine lymph remain active if kept in a refrigerator?*

A.—The Therapeutic Substances Regulations relating to vaccine lymph lay down that the container in which the lymph

is issued for sale shall bear a statement that the potency of the vaccine lymph cannot be assured for more than seven days from the date of completion of manufacture, unless the lymph is kept continuously at a temperature below 10° C. (50° F.), when the potency can be assured for 14 days; provided that it shall be permissible to state that if the lymph is kept continuously below 0° C. the potency can be assured for at least twelve months.

A temperature of 10° C. or 50° F. is approximately equivalent to the temperature of a domestic refrigerator. These regulations are conservative, and there is little doubt that the lymph will retain adequate potency for longer periods than those stated above. However, since there is no control of the conditions under which the lymph may be stored, neither the manufacturer nor the issuing authority can accept responsibility for the potency of the lymph if kept beyond these periods.

Twins and their Finger-prints

Q.—*Can identical twins be distinguished from each other by their finger-prints?*

A.—The distinction between monozygotic identical twins is best made on finger, palm, or toe prints (with decreasing certainty of differentiation). Cherrill, the New Scotland Yard expert, has yet, in spite of a special study of twin 10-print records, to find identical features. Newman, H. H. (*J. Hered.*, 1940, **31**, 119 and 419), has made an extensive survey of the genetics of the subject, and its criminal aspects have been studied by Johannes Lange in his *Crime as Destiny* (1931), Geo. Allen and Unwin, London. It is clear that in personality, character, and the minutiae of identity data no indistinguishable twins have yet been observed.

Prolonged Oestrogen Therapy

Q.—*A patient discovered that a few milligrams of stilboestrol, given to restrain lactation after a stillbirth, vastly improved a seborrhoeic dermatitis. Since then she has been taking 1 mg. every other day. The only untoward effect is that menstruation has become slightly irregular. If she stops the drug her skin condition relapses. (a) Is it harmful to continue stilboestrol indefinitely, if the menstrual flow does not become heavier? (b) Is libido likely to be affected? (c) Are her chances of conception altered?*

A.—(*a*) Continuous oestrogen therapy almost always leads to menstrual disturbances associated with intermittent or prolonged and sometimes heavy bleeding. Another possible sequel of long-continued oestrogen therapy is fibro-adenosis (generalized nodularity) of the breast with tenderness or pain. There may also be fluid and salt retention, with increase in weight. There is little evidence of permanent damage to the pituitary due to the inhibitory action of oestrogens. Nor is there sufficient evidence to say that exogenously administered oestrogen may be carcinogenic, though endogenous oestrogen may predispose to cancer. (*b*) No. (*c*) Continuous oestrogen therapy may inhibit ovulation.

It would be better to give the stilboestrol in doses of 0.5 mg. daily for the first 21 days of each 28-day cycle. This dose should not inhibit ovulation in any cycle (though a daily dose of 2 mg. probably would), and the week's rest from treatment in each month should lead to successful avoidance of the disturbances mentioned above. This dose, however, may prolong the cycle to five or six weeks. In that case the dose will need to be adjusted (either down to 0.3 mg. daily or up to 1 mg. daily) so that the period is not delayed.

Prolonged Quinidine Therapy

Q.—*Would the indefinite administration of quinidine sulphate, in a total dosage of 3 gr. (0.2 g.) daily, for the control of auricular fibrillation, cause any harmful effects? The case I have in mind is a man of 38 who had his first attack of auricular fibrillation about 10 years ago. Normal rhythm was restored, and he had no further treatment until six months ago, when he had another attack. This has responded to quinidine, the rhythm remaining normal so long as small doses are given. On withdrawing the drug, fibrillation begins again.*

A.—Quinidine in the dosage stated may be given indefinitely without harmful effects. Indeed, the dose could be increased considerably without fear. The usual amount given to prevent auricular fibrillation is 3–6 gr. (0.2–0.4 g.) three times a day. In his book on quinidine (*Quinidine in Disorders of the Heart*, reviewed at p. 1426 of this issue) Harry Gold states that one of his patients took 60 gr. (4 g.) daily for 14 years without ill effect. When, at the end of that time, auricular fibrillation could no longer be prevented the dose was increased to 75 gr. (5 g.), but this caused impairment of hearing and blurring of vision.

If quinidine does not cause toxic symptoms within the first five days of treatment, such symptoms will not arise later if the dose is not increased.

Post-operative Paralysis of Compressor Urethrae

Q.—*Is paralysis of the compressor urethrae muscle known to occur after a "punch operation" for the removal of an enlargement of the intravesical part of the median lobe of the prostate? If so, how is this paralysis caused? What are the prognosis and treatment?*

A.—Paralysis of the compressor urethrae after a "punch operation" may be due to over-stretching of the muscle from the introduction of a large instrument, or to division if a cut is made too low. In the former case ultimate recovery is likely, but in the latter the incontinence is likely to remain until subsequent fibrosis produces the opposite effect—namely, stenosis. Electrical treatment is not very certain in its results, but plastic operations have been used successfully in some cases to restore continence. It may well be, however, that an individual patient is best assisted by the wearing of an incontinence bag.

Rubber Sponge and Varicose Ulcers

Q.—*How should rubber sponge be used in the treatment of varicose ulcers?*

A.—The object of the rubber sponge is to produce extra pressure over the ulcer and its oedematous surroundings, especially in the case of ulcers in the malleolar sulcus. The rubber pad, which is preferably coated on one side with adhesive, can be used in the following way: an Unna's paste bandage is used to bandage the leg in the usual way, and the rubber pad, which has chamfered edges and is much larger than the ulcer, is then placed over the site of the ulcer. The pad is now pressed down on the ulcer by an elastic bandage or, if the patient is sensitive to these, by means of a strong elastic bandage in the day-time and a crêpe bandage at night. The extra pressure on the ulcer surface generally promotes rapid healing.

Coeliac Disease

Q.—*What are the latest views on the treatment of coeliac disease in a child of 3 years?*

A.—Recently the treatment of coeliac disease has been mainly dietetic. In particular the possible importance of carbohydrate-containing foods in aggravating some aspects of the syndrome has received attention (Sheldon, W., 1949, *Arch. Dis. Childh.*, **24**, 81). It would seem advisable to limit fats and to confine carbohydrate-containing foods to those best tolerated by the patient. A diet with a high-protein content is advantageous. Folic acid and other members of the vitamin-B complex do not appear to have any specific remedial action.

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone.
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